Waiting MAR 1 1 1923

Vol. XXXIII FEBRUARY, 1923 No. 2

THE LARYNGOSCOPE

AN INTERNATIONAL MONTHLY JOURNAL
DEVOTED TO DISEASES OF THE

EAR - NOSE - THROAT

FOUNDED IN 1896 BY
DR. M. A. GOLDSTEIN, ST. LOUIS,
Managing Editor and Publisher.

DR. A. M. ALDEN, St. Louis,
Associate Editor.

COLLABORATORS.

Dr. OTTO GLOGAU, New York;
Dr. ALBERT A. GRAY, Glasgow;
Dr. THOMAS GUTHRIE, Liverpool;
Dr. T. H. HALSTED, Syracuse, N. Y.;
Dr. HAROLD HAYS, New York;
Dr. CHEVALIER JACKSON, Phila.;
Dr. F. LASAGNA, Parma;
Dr. M. D. LEDERMAN, New York;
Dr. HARRIS PEYTON MOSHER, Boston;
Dr. FRANCIS R. PACKARD, Phila.;
Dr. W. SCHEPPEGREL, New Orleans;
Sir ST. CLAIR THOMSON, London;
Dr. W. A. WELLS, Washington, D. C.;
Dr. D. J. GIBB WISHART, Toronto;
JOHN D. WRIGHT, New York;
Dr. SIDNEY YANKAUER, New York.

For Contents See Page 1.

Subscription, $6.00 per Annum, in Advance.

Foreign Subscription, 35 Shillings per Annum, Post Free.
Single Copies, 75 cents.

PUBLISHED BY THE LARYNGOSCOPE CO.
3858 Westminster Place, St. Louis, Mo., U. S. A.

FOREIGN OFFICE, BAILLIERE, TINDALL & COX,
8 HENRIETTA ST., STRAND, LONDON, ENG.

[Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter, in July, 1896.]

The first four numbers of this new quarterly have been issued. Subscribe now.

Vol. 2 JANUARY, 1923 No. 1.

ORALISM AND AURALISM

A QUARTERLY JOURNAL
DEVOTED EXCLUSIVELY TO SPEECH PROBLEMS

EDITOR
MAX A. GOLDSTEIN, M. D.
St. Louis

COLLABORATORS:

C. S. BLUEMEL, M.A., M.D., Denver.
FRANK W. BOOTH, Omaha.
JULIA M. CONNERY, St. Louis.
A. L. E. CROUTER, LL.D., Mt. Airy, Pa.
ELBERT E. GRUVER, Council Bluffs, Ia.
HAROLD M. HAYS, M.D., New York.
ENFIELD JOINER, Trenton, N. J.
ELMER L. KENYON, M.D., Chicago.
MILDRED A. McGINNIS, St. Louis.
HARRIS TAYLOR, LL.D., New York.
JOHN DUTTON WRIGHT, New York.
CAROLINE YALE, LL.D., Northampton, Mass.

Subscription, $2.00 per Annum.
Single Copies, 50 cents.

PUBLISHED BY
THE LARYNGOSCOPE CO., ST. LOUIS.
Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter, February, 1922

THE

LARYNGOSCOPE.

VOL. XXXIII ST. LOUIS, FEBRUARY, 1923 No. 2

ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

WAR SURGERY OF THE LARYNX, WITH SPECIAL REFERENCES TO THE WORK AT CAPE MAY.*

DR. GORDON BERRY, Worcester, Mass.

This paper purposes to discuss war surgery of the larynx, first reviewing hurriedly the fairly abundant literature, then taking up in turn the twelve laryngeal cases treated at Cape May, with special reference to the writer's efforts then and since to clear the three severest cases, and finally pointing out some of the lessons which this experience has taught.

In calling this subject to your attention the writer is not unmindful of the very important part this Association played, both collectively and individually, in the recent struggle. It was your committee, appointed in the first days of the war, who met with others and were instrumental in formulating a plan the fruition of which was the forming of U. S. General Hospital No. 11 at Cape May, N. J., for the exclusive treatment of head injuries and diseases; and it was to two of your members in Washington, Colonel Mosher and Colonel Richardson, each of whom rendered such signal service in his respective field of endeavor, to whom the writer was immediately responsible, and who so aided him with wise counsel and encouragement. To two others he would also make particular acknowledgment. Dr. Jackson made a special trip to Cape May, where his kindly and careful advice was of great assistance, and his subsequent timely suggestions have helped over more than one rough place. In the more recent work with the stenosed conditions the writer has drawn freely on Dr. Lynah's rich experience and has found him never too busy to lend a helping hand. Finally, it was

Colonel Ingersoll, our chief during the first eight months of my service, whose faith gave courage to continue in this discouraging work. I am thus in the position of one rendering a report to his master of work entrusted to his care.

In reviewing the literature on this subject the writer has gone fairly systematically over the English, French, German and Austrian journals during the last five years and finds a wealth of material, but of a rather heterogeneous nature. The most of the articles deal with acute and recent cases. Subsequently, writers like Harmer[16] have compiled the statistics available and drawn conclusions, and Moure[33] has written his book on the subject. Now, as the smoke of battle clears away, the scattered cases are gravitating to the larger centers like London, Berlin, Paris and Bordeaux, and we will be hearing reports of those that have done less well and need further care. It is in this type of case that this paper particularly deals.

NUMBERS REPORTED. In the American Civil War (according to Allenbach[35]), 235,585 were injured, of which 82, or 0.035 per cent, had laryngeal wounds; in the war of 1870-71, 99,556 were injured, with 65, or 0.06 per cent, laryngeal wounds. Oertel[48] gives about the same figures for the Balkan War. In the World War many more laryngeal cases are reported and the available percentages are higher. One author (Allenbach[35]) reviews thirty publications, finding 110 cases, of which Koerner gave 16, Killian 22, Scherer 7 out of 2,500 wounded (or 0.28 per cent). Lannois, Sargnon and Dauriac[30] reported on 57 cases, Boehler[1] discusses 9 acute cases, Koerner[46] gives detailed findings in 33 cases and von Meurers[51] gives 18 cases. Harmer[16] writes more recently of 245 cases which he had observed or investigated through the English hospitals or by writing to eighty laryngologists. Bruening[37] gives 6 cases and Kofler and Fruehwald[44] review 21 cases from the Vienna Clinic. Oertel[48] discusses Thost's 11 cases and odd cases from Kohler, von Kofemann, Bleyl, Auersbach and Zange; while the following men report one or two cases apiece in the English journals: Stuart-Low[22], Tod[14], Syme[23], Peters[21], Davis[11], O'Malley[17], Hill[17-18], St. Clair Thomson[25], French[14], Milligan[20]. In the French periodicals we find reports of cases by Canuyt[26-27], Guyot[29], Guisez[28] and Moure[31-32].

NATURE OF THE INJURY. Not only is the larynx difficult to hit; but when hit such injury usually proves fatal. A shot from in front, the most dangerous according to Moure, is likely to shatter the spinal cord; or a tearing shell fragment may cut one of the great vessels (von Meurers[51], Harmer[46]). The number surviving long enough to reach medical care is thus small. In one series (Kofler

and Fruehwald[44]) of injuries to the upper respiratory passages, 25 per cent involved the larynx and 1½ per cent the trachea. The commonest place of entry was the anterior triangle of the neck. Transverse wounds were more common than oblique. A bullet may dissect its way between the important structures of the neck and do them but temporary harm. The wound of entrance is usually small, that of exit large and jagged and the damage to the cartilaginous structures may be much worse than the external wound would suggest. Subglottic wounds appeared to be the most serious. Tracheal injuries were rare. The pharynx and esophagus were often included. Perforating wounds were more common and less dangerous than penetrating. In Harmer's[15] series of 108 cases the injury was caused by bullets in 58, by shrapnel in 20, by shell fragments in 6 and by bayonet in 1. Allenbach[35] found 80 per cent of war laryngeal injuries to be due to gunshot wounds. The least harmful missile (Oertel[48]) was a perforating bullet at from 100 to 500 meters' range. Investigations in our army showed that in early flight the centrifugal action of the bullet had not become entirely effective, while toward the end of the flight this action was not strong enough to keep the bullet in true alignment; hence the least damage if striking while in mid-flight.

Symptoms: The principal symptoms given are aphonia, hemoptysis, dyspnea, external hemorrhage, dysphagia, emphysema, difficulty in moving the neck, and injuries to the neighboring nerves. The more frequent complications are bronchitis, pneumonia, septicemia, mediastinitis and gas infection.

Diagnosis. The diagnosis can be in little doubt. The appearance of the patient may be dramatic. The sudden loss of voice, the spitting of blood, the blowing of air and the sucking of blood through the wound would try the courage of the most seasoned soldier.

Treatment. The treatment depends upon the nature and severity of the lesion and may be divided into palliative and radical. The first depends upon rest, sedatives, steam inhalations and allied medication. Many cases were cured in this way. The first need is to prevent choking. If palliative measures do not serve, a tracheotomy becomes imperative. This can be delayed longer if the case is under close hospital observation; while if it is to be transported, in case of doubt an initial tracheotomy is advisable. Harmer[15] and Allenbach[34] found that about one-third of all the cases required tracheotomy. The point of election of this operation is somewhat in dispute, though all agree that if the condition is urgent the quickest route is the best. Moure[33] tries to go through the wound if haste

is called for. If he has time he prefers to enter at a distance from the wound, thus keeping away from the sepsis and subsequent perichondritis. All advise against going between the cricoid and thyroid. The thyrohyoid membrane makes a poor entrance, as the epiglottis is in the way. Preference is given for two routes: the high and the low tracheotomy—the high entering at or near the second tracheal ring, where the trachea lies superficially and can be more readily entered, the low entering through the third to the fifth tracheal ring. Since the trachea becomes more deeply situated as it passes down the neck, the lower the tracheotomy the harder, also the more danger of infection or emphysema entering the mediastinum. The high entrance lends itself to retrograde bougienage or the anchoring of dilating intubation tubes. The low is more remote from the infection of the laryngeal wound and removes further the irritating cannula. The majority of the writers prefer the high tracheotomy first and a low one later should the cannula have to remain in for a long time.

Bleeding may be severe. If a great vessel has been severed death usually comes before proper aid can be secured. There are two other forms of bleeding to be considered: extralaryngeal, which is controlled by the usual surgical procedures, and intralaryngeal. The latter may be in the mucous membrane or in the cartilage. The intralaryngeal bleeding usually stops of itself, but von Meurers[51] had two cases that failed to. He did a prompt laryngofissure, picked out the fractured pieces of cartilage and sutured the torn mucous membrane, controlling capillary hemorrhage by pressure and a styptic. He packed the wound open ten and thirty-four days, respectively, then sutured the thyroid together over a temporary intubation tube. This and the tracheotomy tube were soon removed, with resulting good breathing but a continued husky voice.

The emphysema takes care of itself after free breathing has been obtained and the wound is opened up—unless the mediastinum is involved, when the prognosis is grave. Killian found emphysema and dyspnea more frequent in subglottic injuries, von Meuerers[51] found more where the lower pharynx was wounded. Dysphagia when due to traumatic swelling disappears as the edema goes down. If, however, the esophagus has been cut the edges should be sutured and the patient fed for a while through a tube or by rectum.

Injury to the nerves of the neck may be direct or indirect. Koerner[46] noted a bilateral recurrent laryngeal paralysis from indirect trauma. The missile struck the larynx a glancing blow, injuring neither the larynx nor the nerves. The paralysis disappeared. Individual branches of the superior or inferior laryngeal nerves may

be injured or the missile may paralyze the ninth, tenth, eleventh and twelfth nerves on one side, singly or all together. Koerner[45] reports a case in which the vagus, spinal accessory and hypoglossal were not directly injured, but were caught in a scar with consequent paralysis. By neurolysis he was able to free these nerves with a later partial return of function, the only case he knew of where such an attempt had been successful.

Any portion of the laryngeal structure may be selected by the injuring missile. The cricoid alone is rarely fractured. Either thyroid plate may be comminuted. The crico-arytenoid articulation may be disturbed, with later ankylosis. A section of vocal cord may be punched out. The muscles may be injured or paralyzed, singly or in groups. Of these the cricothyroid is frequently hurt; the crico-arytenoideus posticus and the aryarytenoideus very rarely because of their deep situation.

The indirect laryngeal picture should be studied as early as possible. In this way tears of the mucous membrane, edematous stenoses and early paralyses may be determined and recorded against later change. Much help and instruction can be gained from such frequent observations.

Most of the cases show early stenoses. These are due to local inflammation, or edema, or a hematoma, or an abscess. They may be due to an arytenoid ankylosis or to a bilateral abductor paralysis. Many of these cases, though seeming to need a tracheotomy, will quiet down under sedatives, inhalations and rest. When necessary a high temporary tracheotomy is done. In almost all of the cases reported the stenosis soon disappears enough to permit per-oral breathing, and the cannula is removed in a few days, the wound promptly closing itself. In these acute cases the prognosis is favorable, though a complete functional cure is rare. Good breathing returns in all, but most of the writers note a hoarseness or an easy tiring of the voice, which continues. This may be due to partial loss of a vocal cord or to a unilateral ankylosis, or to a one-sided paralysis. In such cases the other side develops a compensatory action which is sufficient for ordinary use. The time before these acute cases clear and compensation is established varies according to the severity of the lesion from one week to a few months.

Chronic Forms. Passing thus cursorily over the acute forms we come to a discussion of the chronic cases. Moure, Liebault and Canuyt in their notable work on *War Pathology of the Larynx and Trachea*[33] go most extensively into the subject. Harmer [15-16], Lannois[30], von Meurer[51], Allenbach[35], Oertel[48], Kofler[44] and Bruenings[37] give the more exhaustive discussions in the foreign literature.

Let us pass first, however, to a careful review of the twelve laryngeal cases at Cape May. If one recalls the large number and variety of cases admitted on this Oto-Laryngological Service and the probable fact that a great proportion of all the chronic severe laryngeal cases came to Cape May, it would seem that the number of laryngeal injuries in the American Army was small. Because they represent most of the varieties discussed in the European literature, and because relatively little appears in our own journals concerning these war injuries of the larynx, the writer is encouraged to make our twelve cases a matter of careful record and to go into greater detail than would be otherwise fitting. In a "comment" after each case the salient points are discussed. The more trying cases are entered first.

CASE HISTORY.

CASE I. Diagnosis: Gunshot wound of the larynx. Perichondritis with fistula. Stenosis. Laryngofissure. A chronic tracheotomy case.

History. Pvt. L. M. was taking back some prisoners he had captured in the St. Mihiel Sector on September 14, 1918, when pieces of shrapnel from an overhead exploding shell entered his neck, also fractured his right forearm. Loss of voice and bleeding from the mouth followed at once. He made his prisoners give him emergency treatment. The missile entered the neck on the left at the upper border of the thyroid and came out a little lower down anterior to the sternomastoid muscle. Eight hours later an operation cleaned up the wound of exit, but was unable to recover a small metallic fragment which still remains just in front of the right lateral process of the fifth cervical vertebra. This has given him no trouble. Five weeks after the injury the neck became swollen and was incised in the midline, evacuating pus. Two weeks later while on the transport coming across, breathing became so labored that an emergency high tracheotomy was done. The tube was removed two days after landing. One week later, while on the train for Cape May, respiration again became difficult. He reached us on November 10, 1918.

Examination at this time showed a high tracheotomy wound with a small discharging fistula one-half inch above it admitting a probe directly into the lumen of the larynx, with some necrosis and loss of cartilage along its path. The other wounds were healed. The laryngeal picture was one of pronounced tumefaction of the ventricular bands, closing the glottis. A little air was being forced through.

Treatment. Steam inhalations and sedatives were of no avail, so a tracheotomy tube was inserted through the old wound, to be

lowered later at Dr. Jackson's suggestion. A temporary emphysema followed this latter operation, which quieted in two days. The fistula was curetted and treated periodically. It cleared somewhat but would not heal.

Laryngofissure. On June 18, 1919, seven months after admission, the thyroid cartilage was split open under local anesthesia. The fistulous tract was dissected out. It did not lead to the foreign body. Two or three suggestive raw areas in the membrane were curetted and the edges united with sutures. There was much edema and infiltration of the mucous membrane, particularly around the arytenoids and cords. A soft rubber tube was placed in the glottis, anchored to the tracheotomy tube and the wound carefully sutured over it. Six days later the rubber tube was removed through the tracheotomy wound. The wound was then healed, but broke down later, to discharge three weeks and then heal permanently.

On July 27 a dilating soft rubber tube was inserted from above, anchored to the tracheotomy tube and removed on the ninth day. On September 5 and on October 31 some granulations were removed from below the left vocal cord by direct laryngoscopy. He had been encouraged to periodically close the tracheotomy tube. By November, 1919, he was able to keep the tube plugged all day, and on the fifth the No. 2 tracheotomy tube was removed permanently. The tracheotomy wound closed in twenty-four hours. Breathing was labored during the first two or three nights only.

Result. The patient was discharged in January, 1920, and sent to Worcester for further care, where trichloracetic acid was applied to small granulations on February 27 and the stenosis was dilated on March 6. A mild recurrent tonsillitis kept the throat congested and the tonsils were removed on September 30. No other surgical treatment has been employed. He has been having voice-training lessons under an expert and gradually a husky whisper voice has been getting some tone. The laryngeal picture is one of almost complete paralysis of the remnant of the left vocal cord, with free motility of a rough-edged right. The left arytenoid moves a little. Phonation leaves a chink between the cords at the middle third. There is a lateral mounding firm tissue in the subglottic space which leaves a slit-like vent 2-3 mm. broad, similar to that through the glottis. This gives ample respiratory space excepting when he exercises violently. There is also slight embarrassment at night during a severe cold. Damp, cold weather aggravates the congestion. He is a farmer by trade and has returned to North Carolina to work. He writes that he gets out of breath with heavy farm work. A

weak heart is partly responsible for this. It may be necessary to dilate the partial remaining subglottic stenosis a little further, but the writer anticipates that no further treatment will be needed. The voice should improve but always be husky.

Comment. In this case a perichondritis may be considered the cause of the abscess and of the later acute stenosis, which necessitated a tracheotomy seven weeks after the injury. The perichondritis also prevented the fistula from yielding to eight months of earnest treatment. Only the complete cleaning up of the process in the laryngofissure operation controlled this perichondritis. With the infection out of the way the problem became the uncomplicated one of opening up the fibrous laryngeal stenosis.

CASE II. Diagnosis: Gunshot wound of the larynx and trachea. A chronic tracheotomy case.

History. Sgt. A. K. was shot through the neck by a sniper in the Argonne Forest on September 29, 1918. The bullet entered just below the cricoid near the midline, traversed the trachea and deep structures of the right neck and came out behind in the right scapular region, where it made a large ragged wound. It knocked him down momentarily. Then he ran about fifty yards, where stretcher-bearers met him. Several mouthfuls of blood were spit up. There was immediate aphonia and paralysis of the right arm. The patient was hurried back successively to the first aid station, the regimental aid station and a field hospital by stretcher and motor truck. Here, twenty-four hours after the accident, an emergency tracheotomy was done. Thence he went by train to the first base hospital, where his condition became worse. He could not swallow and rectal feedings were necessary for a while. When better he was sent in November to a second base hospital. Three more base hospitals brought him to Brest, where after a week's rest he was transported to New York. Here he stayed varying lengths of time in the debarkation hospital, then in two general hospitals, then at a base hospital. In July, 1919, he was sent to the general hospital at Fox Hills on Staten Island, where our Service had been transferred on the closing of the Cape May Hospital.

Examination. Patient wearing No. 5 tracheotomy tube, passing in at about the second tracheal ring. Wounds all healed. No discharging perichondritis. The laryngeal picture shows a general swollen appearance of the ventricular bands hiding laryngeal detail. A little air can be forced through. General condition good.

Treatment. First the tracheotomy tube was partially plugged with a rubber cork for a little while each day. In this way a little laryngeal breathing space was gained. On August 29, 1921, the

larynx was dilated from above and a soft rubber tube, beveled longer posteriorly, and long enough to reach from the tracheotomy tube to just below the vocal cords, was tied to the cannula. This rubber tube was removed nine days later. On September 29 the stenosis was dilated from below and again one week later. By October 10 he could keep the tube plugged tight for half an hour at a time. A smaller tracheotomy tube (No. 3) was now used. On November 6 the anterior subglottic scar was partly cut with a laryngeal knife and cauterized with trichloracetic acid.

The writer was now discharged from military service. Two months later this patient was sent to Worcester to be under his care. Here the stenosis was progressively dilated five times. Usually the soft rubber intubation tube was inserted for four to eight days after each dilatation. Then Dr. Lynah kindly pointed out the superior value of cutting the adhesions with the thermocautery. They had proved so tough that little progress was being made. Dr. Lynah's tracheal cautery equipment was obtained and used twice, with pronounced gain.

Result. The patient is now wearing a No. 2 tube. This he corks tight night and day, excepting when he gets a cold. Colds have delayed his progress a great deal.

The laryngeal picture shows some motility of both arytenoids, the left more, which passes part way behind the right. Both cords are rough and show some loss of tissue in the middle third, preventing complete phonation. The left cord moves, the right is almost fixed. Below the cords the space measures almost normal anteroposteriorly (where the fibrous stenosis has been cut), but there is a lateral mounding of fibrous tissue anteriorly. The reaction from the last dilatation six weeks ago has not entirely gone. A speaking voice is present, but is very husky. On a warm day he can play baseball with the tube plugged. It is hoped that the tracheotomy tube can be permanently removed after one more cautery operation.

Comment. The difficulties many of the patients had in transportation is described in this case which went to fourteen successive medical units during nine months of travel before constructive work could be successfully begun. The laryngeal stenosis had by then become more firm and fibrous and the cure was in consequence delayed. It was to alleviate this trouble in so far as possible that skilled surgical units were taken up to the fighting line in this war. Had the war lasted longer speedier transportation of these chronic cases to their ultimate hospitals would have been established.

A little of the detail of corking the tracheotomy tube (as Jackson suggests[6]), of progressive dilatation and of cautery of the sten-

otic bands is inserted here and in Case III. It may be added that the old fenestrated tube, designed to encourage peroral breathing, has been discarded in our experience in favor of the non-fenestrated tube. A No. 6 or No. 5 is used first. As rapidly as peroral breathing will permit a smaller tube is used. This procedure serves a three-fold purpose. It progressively discourages tracheotomy breathing; it permits more room around the tube for peroral breathing; and (very important) the pressure of this passing air discourages the granulations and infiltrated swellings around the tube, particularly above it, which later are so hard to reduce.

CASE III. Diagnosis: Gunshot wound of larynx. Stenosis. Chronic tracheotomy case.

History. Pvt. H. J. C., while in action at Soissons on July 19, 1918, was struck in the neck, right thigh and buttocks by shell fragments. Four days later a high emergency tracheotomy was done and the patient was still wearing the tube when he reached Cape May on October 24, 1918.

Examination at Cape May. The larynx shows much congested ventricular bands which almost meet. The cords are dark red and swollen. The rima glottidis is a mere slit which opens a little on forced respiration. Right arytenoid asymmetrically placed to the side.

Treatment. After two dilatations the patient could plug the tracheotomy tube shut for half an hour at a time on December 16. On February 20 he was able to plug the cannula for an hour and a smaller cannula was inserted (No. 4). In May a dilating soft rubber tube, bent double, after the method of Iglauer, was anchored in the subglottic stenosed space. One week later this was replaced by a larger straight rubber tube. A still larger one was inserted after five days. These tubes remained in almost a month. On September 21 he could plug the tube shut for two hours at a stretch. One month later this lengthened to three hours. Then there was a cold with a temporary setback. As the writer was soon to leave military service an attempt was made on November 5 to permanently remove the tracheotomy tube. Peroral breathing was almost adequate. The cords tended to collapse on inspiration like a double valve. Eleven days later the breathing became too labored, the patient was becoming white from chronic air-hunger and the tracheotomy tube was replaced. With the expulsion of considerable sticky mucus normal tube-breathing was re-established. In January, 1920, the case was put under the writer's care in Worcester. Now followed a successive series of discouraging colds which seemed to undo much of the benefit gained from seven dilating operations similar to those in Case

II. At present he is recovering from a cold of two months' duration. The rima glottidis is but a narrow space through which he can breathe and keep the cannula plugged shut for perhaps an hour. When the cold is gone the subsiding edema will permit the plugging tight of the tracheotomy tube for a week at a time. The vocal cords are both fairly freely movable. The stenosis is immediately below. The left arytenoid is fixed.

Comment. This has proved the most stubborn case of the series. Two special phases should be noted: First, these laryngeal cases catch cold easily. During such a cold laryngeal manipulation is much more difficult, and apparently no benefit is gained. More than half of the time in this case was spent in no attempt at treatment other than trying to control his colds. The removal of his tonsils helped a little. There was a diffuse congestion of the mucous membrane of the upper respiratory tract of a rather passive chronic type. Earnest efforts to find a localized infection as a causative factor yielded nothing. Second, the tracheotomy tube should be left in until the patient can plug it tight under every possible condition without embarrassment. The tube was removed over a year ago in this patient, but had to be reinserted after eleven days of somewhat labored breathing. Now, excepting when he has a cold, he does not need the tube.

Note that Case II shows a movable arytenoid with its cord so bound down by scar tissue as to be practically fixed. On the other hand Case III shows an ankylosed arytenoid with its vocal cord movable.

CASE IV. Diagnosis: Fracture of the cricoid, with perichondritis and laryngeal stenosis. Chronic tracheotomy case.

History. Pvt. P. H. R. fell 300 feet with his aeroplane. Suffered lacerated wounds of the jaw, the forearm and the leg. Unconscious four hours. Had a little trouble with breathing, but was returned to active flying in three days. Three days later he was sent back to the hospital on account of an increasing difficulty in breathing and an emergency tracheotomy was done (November 27, 1917). One month later he reached Walter Reed Hospital, where Col. Charles H. Richardson diagnosed the fractured cricoid. He noted a marked infiltration of the subglottic mucous membrane, and the glottis so closed as to leave only a minute chink posteriorly through which air could pass. He was transferred to Dr. Jackson's care, who performed a low tracheotomy and inserted a larger tube. Progressive dilatation was done from time to time during the next seven months. The patient was then transferred to Cape May on August 14, 1918.

Examination revealed thickened ventricular bands. The vocal cords were thickened, approximated evenly, but their lateral excursion was small. The subglottic space was almost closed by infiltrated mucous membrane, with a small opening through which a little air could be forced in or out. He was breathing through a low tracheotomy tube.

Treatment. Following Dr. Jackson's suggestion we instituted his "orthopedic treatment," closing off the tracheotomy tube with a rubber cork as much as possible and so encouraging the establishment of a laryngeal passage. At first the tube was partly closed for a few minutes at a time. This time was lengthened and then more of the lumen of the tube was shut off. Too prolonged closure of the tube resulted in air-hunger and progress was slow. He remained under this treatment for five months and then was discharged from military service and returned to Dr. Jackson's care, where the progressive dilatation and the periodical corking of the tube were continued.

Result. Six months later we heard that he was still wearing the tube, but that there was a freer laryngeal passage. Progress in this case was thus slow, but sure. By closing his tracheotomy tube with his finger when talking he could speak with a husky but readily intelligible voice, which did not tire easily.

Comment. The undiscovered cricoid fracture and later perichondritis gave the stenosis a good start. The high tracheotomy, though the proper thing to do at first, furnished an irritant to the infected swollen area, and it was not until the low tracheotomy by Dr. Jackson removed this irritant that the swelling began to go down.

CASE V. Diagnosis: Perforating gunshot wound of the larynx, with perichondritis and laryngeal stenosis. Tracheotomy. Laryngofissure. Discharging fistula.

History. Pvt. J. H. was struck by a machine-gun bullet at Catigny, France, on May 28, 1918. The entrance was in the right carotid region, with exit at about the same level in the left sternomastoid region, the bullet passing through the larynx. An operation was performed the next day. Nothing was done to the wound of entrance; a debridement was done to the wound of exit. The thyroid cartilage showed a compound comminuted fracture. The condition of the wound prevented good coaptation of the cartilage fragments. The larynx was opened and cleaned. The mucous membrane was very edematous, particularly in the region of the ventricular bands and the epiglottis. A high tracheotomy tube was inserted. Two weeks later the sutures had to be removed because of suppuration in the wound. Still one week later the tracheotomy tube

was removed, not to be replaced. In the meantime he was transported from station to station, finally reaching Cape May four months after the injury, on September 21, 1918.

Examination at Cape May. Swelling of both ventricular bands; infiltration of interarytenoid mucous membrane; thickening of vocal cords, which, however, are intact and approximate symmetrically. A fistulous tract near the cricoid cartilage discharges a little pus when the patient swallows. Not wearing a tube. Speaks in a whisper. General condition good. X-ray report negative; no special fracture or peculiarity discernible.

Treatment. The sinus was curetted from time to time and an attempt made to remove any necrotic cartilage along the fistulous tract which passed indirectly into the intralaryngeal space. The wound tended to close on the outside and remain as a discharging open sinus on the inside, breaking down periodically externally. On January 25, 1919, four months after admission, the wound healed and he was discharged on February 7, 1919. At that time the vocal cords still showed marked edema and irregularity. The speech was much better, but still very husky.

Result. A letter from him dated April 29, 1921, says that he reached home without mishap, and then the old fistula broke down and discharged for over a year, when it healed and has remained so. He tried farming, but got out of breath and had to give it up. When he gets heated he chokes. An examining officer tells him he will never be able to do hard work. He is doing nothing now. The voice is stronger, like that of a man with a severe cold.

Comment. The more prompt favorable result in this case was unquestionably due to the early radical clearing up of the lacerated bullet path. Had the case not had to hurry on to the rear the fistulous tract which developed might have been easily controlled. The writer should have opened and cleaned up this fistula when the case reached him. Palliative measures seemed to serve and operative timidity played a part. Instead of the process healing, as was supposed, it simply closed on the outside and continued to drain on the inside. For this reason it broke down after it left us and continued to give trouble for a year, healing of itself finally.

CASE VI. Diagnosis: Penetrating gunshot wound of the larynx, with perichondritis and discharging fistula. Tracheotomy.

History. Pvt. Z. P. was wounded by two shell fragments in the Somme Sector on May 3, 1918. The larger missile passed through the neck and then the left arm; the smaller was removed from the neck on the next day and a high tracheotomy tube inserted to control the dyspnea. This tube was removed after twenty days and not re-

placed. He was transferred to this country and admitted at Cape May on November 26, 1918, about six months after the injury.

Examination on admission revealed swollen ventricular bands, with some loss of tissue on the left. This swelling hid the true cords. There was sufficient breathing space. Almost in the median line an external suppurating sinus led to the left, through the left wing of the thyroid cartilage, ending on the inside beneath the thyroarytenoideus muscle and the laryngeal mucous membrane. The X-ray showed two small metallic fragments buried in the soft tissue of the right neck. They were doing no harm and were not disturbed.

Treatment. The sinus was curetted and packed open with gauze on November 29, 1918. On January 10, 1919, the sinus had ceased discharging and had healed. Two weeks later the laryngeal examination showed the ventricular bands less swollen and the vocal cords easily seen. The right was thickened and moved fairly freely; the left cord was irregular, with the posterior portion punched out. What was left showed slight motility. Immediately below the anterior angle of the cords there was visible a slight mounding infiltration of tissue. This was near the site of the former fistula.

Result. The voice became stronger, but was still but a loud whisper when he was discharged on February 12, 1919. He did not reply to an inquiry as to the subsequent course of his trouble.

Comment. This case probably did well after his discharge. Though a very similar case to Case V, the effort to curette out the fistula without splitting open the larynx was more strenuously undertaken and met with better success.

Careful x-rays and probing the fistula under the fluoroscope showed that the remaining metalic fragments in this patient and in Case I had no connection with the active process. They were left buried in the soft tissues of the neck and their presence apparently had no ill effect.

CASE VII. Diagnosis: Paralysis of the right inferior laryngeal nerve from perforating gunshot wound of the neck.

History. Pvt. J. H. B. was wounded on October 18, 1918, while in action on the Verdun front. The bullet entered the right axilla, out at the right shoulder, in again low in the right neck, passing behind the trachea and the larynx and out at the level of the cricoid on the left side of the neck, injuring in transit the right inferior laryngeal nerve.

Examination at Cape May three months later revealed a tense immobile right vocal cord situated a little external to the median line. The right arytenoid seemed ankylosed. Phonation was obtained by overapproximation of the opposite cord.

Treatment. Under electrical stimulation and voice-training for a month the right cord showed slight motility.

Result. Treatment was continued a little longer, then the man was discharged from service. The end-result is not known.

Comment. Here we have an illustration of how little damage a perforating bullet can do. It apparently passed between the trachea and the spinal column, carefully missing both as well as the esophagus, and failing to injure the vessels and nerves of the neck. There was a paralysis of the right inferior laryngeal nerve, but this was clearing. Apparently the blow from the passing bullet served to partially fix the right crico-arytenoid joint.

CASE VIII. Diagnosis: Fixation of the left arytenoid caused by bomb fragment.

History. Pvt. N. K. was struck by a fragment from an aerial bomb in the Argonne Forest on September 28, 1918. The missile entered the neck in the midline at the thyroid notch and did not emerge, remaining deep in the neck near the left brachial plexus. There was bleeding from the mouth for a short time, but little dysphagia and temporary paralysis and numbness of all the extremities. The wound discharged for one month and then healed. He was admitted on the neuro-surgical service at Cape May on December 5, 1918.

Examination showed a fixation of the left arytenoid. The left vocal cord was much swollen and was fixed near the midline. There was a compensatory motility of the opposing vocal cord, and a rather husky but fairly strong voice was the result.

Treatment. Silver nitrate was applied to the swollen cords. Electrical stimulation of the larynx.

Result. Some improvement in voice. Discharged in May, 1919.

Comment. The electrical stimulation of the paralyzed laryngeal muscle during the period of inferior laryngeal nerve rehabilitation was thought to have helped this progress considerably.

CASE IX. Diagnosis: Gunshot wound of the trachea.

History. Pvt. C. F. was struck by a flying piece of shrapnel while in action on June 16, 1918. The fragment passed through the base of the neck, anteriorly, from side to side. The trachea was cut. An operation united the cut edges of the trachea. A tracheotomy was not necessary. There was also a gunshot wound of the left chest. Both wounds had healed when he reached Cape May on September 14, 1918.

Examination. Vocal cords inflamed and thickened; move symmetrically; no ulceration. Considerable subglottic edema present, hiding the trachea from view. Patient speaks in a whisper.

Treatment. Vocal training and electrical stimulation.

Result. The voice gradually returned, but continued husky and tired easily.

Comment. Skilful and prompt work at the front was responsible for this favorable result. Even a tracheotomy was not necessary. This and Case II were the two cases in this series in which the trachea was injured. The European writers found injuries of the trachea relatively rare and serious.

CASE X. Diagnosis: Laryngitis chronic with aphonia, from inhaling gas.

History. Cook J. C. L. inhaled "gas" while in the Chateau Thierry Sector, France, on July 17, 1918. Loss of voice followed. He was transferred to this country and arrived at Cape May on March 7, 1919.

Examination. Patient speaks with some difficulty and in a whisper. Both vocal cords are thickened, not punched out by traumatism or ulceration; are equally mobile but do not approximate completely. Edges of cords coarse and lax.

Treatment. Local stimulation and voice training.

Result. Patient was discharged on June 5, 1919, after prolonged voice-training. The voice on discharge was hoarse and but little better than a whisper. He was followed by the Public Health Service and they reported but little improvement. Attempts at further voice-training met with little enthusiasm or success. He was able to make himself readily understood.

Comment. This is a rather typical gas case. There were several of them at Cape May, but the larynges were not sufficiently injured to include them in this series. In this type the examination showed only a low-grade chronic congestion of the laryngeal mucous membrane. There was a troublesome cough, sometimes a bronchitis. The voice would become hoarse and tire easily. Colds were frequent. The process was always indolent; there seemed to be little that we could do. The writer learned to have a wholesome respect for a so-called mild gas case. The unsatisfactory improvement in Case X was to be expected in the light of our experience with milder cases.

CASE XI. Diagnosis: Laryngeal papilloma, from mustard gas.

History. Pvt. F. J. N. was burned with mustard gas on June 29, 1918, over his hands, thighs and scrotum. Two weeks later, while under treatment for the gas burns, his throat became very sore and swollen and he was unable to swallow. In another week the swelling had subsided, leaving him without voice. He was transferred

to this country and reached Cape May on November 6, 1918, still speaking in a whisper.

Examination revealed two smooth, soft polypoid masses, pedunculated, attached immediately below the right vocal cord, which came up between the cords on phonation preventing complete approximation.

Treatment. The papillomata were removed under local anesthesia, by direct laryngoscopy, on November 11, 1918. The speech returned at once. The patient was discharged cured on December 16, 1918.

Result. In response to an inquiry this patient writes on April 22, 1921; that he caught a severe cold one month after his discharge, and during the cold he could not talk above a whisper; that he has been able to talk since, but that the voice is hoarse at times, and tires fairly easily.

Comment. This is a different form from Case X. Mustard gas proved particularly dangerous in that patients and assistants in the wards could get fresh burns from particles coming from clothing, hair and dressings. Such was evidently true here. The throat was free until two weeks after he had the gas burn. Then, while in the ward, his throat became sore and swollen. From the burned areas the papillomata later sprang. Cure followed their removal. His subsequent hoarseness can be attributed to the indolent chronic laryngitis so many gas cases have.

Case XII.—Diagnosis: Papilloma of the larynx from exposure.

History. Sgt. F. M. M. first noticed his hoarseness while on the Mexican border in June, 1917. This disappeared of itself to return while on duty in France in November, 1917, immediately after a severe cold with fever for ten days. No history of exposure to "poison gas" at this time. The voice continued husky.

Examination at Cape May on August 28, 1918. Both vocal cords present and movable; a little of the left appeared ulcerated away and a papillomatous mass filled the anterior commisure.

Treatment. Papillomata removed with forceps under direct laryngoscopy at three successive operations.

Result. Patient discharged on December 18, 1918, with vocal cords healed, slightly thickened and phonating normally. No papilloma seen. A speaking but husky voice was present. A letter dated April 21, 1921, says there has been no subsequent operative treatment; that the voice is erratic and he sometimes loses it for a day at a time. He is now an automobile salesman.

Comment. It was a debated point whether "gas" had anything to do with this case. His hoarseness began in earlier life, cleared,

returned while he was on the Mexican border to clear a second time, and finally returned to remain, under the rigors of army life in France while acting as chauffeur for general officers up and down the line in all kinds of weather. When he came to Cape May the papillomata were of the classical type and their operative course was typical.

Analysis of Cases. An analysis of these twelve cases shows the cause of injury as follows: exposure (meaning the bad weather conditions the soldier was at times exposed to) 1, gas 2, aeroplane fall 1, by gunshot wound 8, of which 3 were bullet, 3 shell fragments, 2 shrapnel. 2 cases developed laryngeal papillomata. The trachea was injured in 2.

In 6 cases a high tracheotomy was done. Three of these received a later low tracheotomy. The time elapsing between injury and tracheotomy was: one day in 3 cases, four days in 1 case, seven days in 1 case, seven weeks in 1 case. In 2 cases the tracheotomy tube had to be reinserted after too early a removal, in ten days in one and in eleven days in the other. Of these 6 tracheotomy cases, the tube was permanently removed in 2 after three weeks, in 1 after one year, 1 is to have his removed soon, 1 will need some time yet, and the sixth one has not been heard from for over a year.

Chronic chondrial fistula were present in 3. All are cleared. A chronic laryngeal stenosis developed in 4 cases, requiring protracted operative treatment. Two thyrotomies were done, one the first day and the other nine months after the injury.

The present vocal result may be roughly classified as: whisper voice 4, weak hoarse 5, strong hoarse 3. Harmer's[15] vocal results in his collected 108 cases give fairer figures, as the 12 at Cape May were not an average group. His list gives: normal voice 17, strong hoarse 24, weak hoarse 12, falsetto 1, whisper 15, dumb 1, not stated 38.

There were no fatalities in our series. In general it may be said that the percentage of deaths increases in direct proportion as the surgeon approaches the fighting line. In this English series 5 out of 108 died. In France the death-rate was much higher. The cases that lived a week usually survived.

CURATIVE MEASURES.

Outline. To take up at length the methods employed by the different writers for the control of chronic laryngeal stenosis would be to prolong this discussion unduly. They may be summarized as follows: intermittent corking of the tube; peroral and retrograde progressive dilatation of the stenosis by bougies and hard or soft intubation tubes; cutting of webs or bands or annular strictures by

knife or cautery; laryngofissure with immediate or delayed closure; and tracheolaryngostomy. All these methods excepting the last were employed in the Cape May cases. If one uses Moure's classification it is the circular or partial type of stenosis which can be cleared by the lesser measures, while the tubular or total type only yields to radical interference.

TRACHEOLARYNGOSTOMY. The most radical method of treating chronic laryngeal stenosis is by a tracheolaryngostomy as described by Jackson in this country and elaborated by Moure[31-32-33] and his French co-workers. The writer has had no experience with this operation. He shares with others the hope that lesser measures, persistently employed, will yield easier, earlier and better results. Important objections to the operation are: the closer confinement of the patient, the impaired speech during much of the time and the protracted time required. All inflammation must first subside before the laryngostomy is done and the severer forms may take one to three years after the operation before a plastic closure of the wound can be undertaken. Nor is the case necessarily completed then.

Moure reports 24 cases of tracheolaryngostomy and Lannois[30] and his associates 14, and their recent reports are increasing these numbers. It is said that Moure has abandoned all other procedures in these chronic stenoses and lays the larynx open as the quickest, surest and most satisfactory means of cure. His book describes the technic in detail and is carefully illustrated, as well as giving the pathology and anatomy and finishing with his 24 case histories. The operation is done under novocain local anesthesia and may be briefly described as follows[16, 33]:

MOURE OPERATION. He splits the thyroid and cricoid and carries the incision down to include the tracheotomy opening. Now he finds the structures not always recognizable and frequently different from the peroral picture. He removes what scar tissue he can, avoiding the esophagus and the ventricular bands. The bleeding points are cauterized. The enlarged canalized cavity is plugged with a gauze roll containing an antiseptic and the tracheotomy tube is inserted at the bottom of the wound. An esophageal feeding tube may be needed for a few days. This dressing is changed every three or four days and replaced in three or four weeks by an intubation tube plugged with a special clip; or he passes his tracheotomy tube through a hole in the side of a soft rubber tube and inserts this. Granulations are treated with 10 per cent chloride of zinc or with silver nitrate. Intubation is required for twelve to eighteen months, after which the cannula can generally be removed and the

open epidermatized trough be closed over by a plastic operation. A buried piece of cartilage may be used to give support to the covering skin flap.

His results in 24 operations were: 8 entirely cured and 16 well on the road to recovery. In the end result the patients breathe naturally, and speak surprisingly well.

GENERAL COMMENT.

EXPERIMENTAL. Burket[2] makes an interesting contribution to tracheal surgery. Working under sterile conditions he removed sections of the trachea from a cat, planted them in culture media, obtained no growth and concluded that the trachea is normally sterile. Then he cut away a section of trachea in eight different dogs, at once replaced the section, carefully sutured the approximated parts and closed the wound. Four survived and four died of dyspnea one to three weeks after the operation. Autopsy showed the dyspnea to be caused by a tracheal stenosis at the point of transplant suture, where microscopic sections revealed the successive stages of mild infection, granulation tissue formation and resulting annular stricture. The surviving dogs were also autopsied. Operative tracheal union was primary and without infection. He concludes that it was infection which caused the stenosis. The Cape May cases do not entirely bear out his conclusion, for two of the three active perichondritis cases were breathing perorally during months of fistulous discharge.

ANATOMICAL. The writer feels that infection plays a very important part in the acute cases, but that the presence of the tracheotomy tube plays a greater part in the chronic stenoses. In Cases I, II, III and IV, after the infection and edema had disappeared, the stenosis was of the tubular type, began not at but just below the true vocal cords and extended down to the tracheotomy tubes when in the high position. This subglottic space is frequently thought to be surrounded chiefly by the thyroid cartilage. In order to obtain a clearer mental picture of the inside of the normal larynx the writer made plaster casts of anatomical specimens. These casts show that the extreme top of the subglottic space only is covered by the lower edge of the thyroid cartilage and that all the rest is covered by the cricoid and first tracheal ring with the intervening membranes. The true vocal cords are 3 to 5 mm. above the lower anterior thyroid border.

When a high tracheotomy is done there is at once a space established between the tube below and the cords above through which no air passes. Nature tends to fill up such a dead space. Since the walls will not collapse the space fills up first with membranous

edema. Then infiltration changes begin. The resulting stenosis is not so much a scar contraction as a new tissue formation built in from the surrounding cartilaginous wall. To defeat this tissue infiltration Jackson advises the early diminishing of the caliber of the breathing tube. More air can pass around a small tube, and this air column at once exerts a positive pressure where a negative pressure previously existed.

In Acute Form. Let us carry this idea further. Does not an early and thorough debridement of the wound followed by wet antiseptic dressings, a prompt tracheotomy to insure complete laryngeal rest, a suturing together of the injured parts when asepsis is obtained and an early changing to smaller tracheotomy tubes with encouragement of peroral breathing offer the quickest cure for a serious gunshot wound of the larynx? Boehler's[51] report from the Poland battlefield shows what favorable results an early tracheotomy in all doubtful cases will yield. In a large number of cases he claims never to have had an edema of the glottis. Von Meurers[51] successfully performed a prompt thyrotomy in two of his cases. Our Case V fared better for this early radical interference. Radical early expert aid is what these cases need. Unfortunately, such aid cannot be always available on a long moving battle-line.

In Chronic Forms. When, however, the case becomes a chronic one there is need of almost infinite patience on the part of both patient and surgeon. One discouragement follows another. Progress is discussed in terms of months, not days. Whether, after lesser means have failed, tracheolaryngostomy will be the operation of choice, the increasing experience of today and tomorrow will determine. The writer hopes a quicker method will be discovered. If his Case III fails to improve soon under the present treatment he is contemplating the following procedure: a thyrotomy, the excision of scar tissue and the insertion of a stent the size of the dilated laryngeal cavity covered with a skin graft. He would suture the thyroid together over the stent if the tissues will permit it, open the wound again after five to seven days, carefully remove the stent and then resuture in the hope that a chondritis had been avoided. Or if the thyroid had to be left open when the graft was planted he would hope to suture it together after the graft had taken. He does not know that this has ever been tried. The principle has been repeatedly used in oroplastic surgery and promises a great saving in time over the tracheolaryngostomy operation if the graft will take. Other methods will be devised. In time the technic will be so perfected that the surgeon will employ this more direct approach with far less hesitation than he does now.

REFERENCES.

AMERICAN.

1. BOEHLER: Gunshot Wounds of the Larynx, report from battlefield in Russian Poland. Surg., Gynec. and Obst., Chicago, 1915, Vol. XXI, pp. 275-277.
2. BURKET: Transplantation of the Trachea. Bull. Johns Hopkins Hosp., 1918, Vol. XXIX, pp. 35-40, 3 pl.
3. IGLAUER: Treatment of Laryngeal Stenosis. Tr. Am. Laryngol. Assn., N. Y., 1918, Vol. XL, pp. 329-342.
4. IGLAUER: Original Methods of Treatment of Laryngeal Stenosis. Annals Otol., Rhinol. and Laryngol., St. Louis, 1918, Vol. XXVII, pp. 1142-1151, also pp. 1233-1238.
5. JACKSON: Peroral, etc. THE LARYNGOSCOPE, 1920, Vol. XXX, pp. 520-526.
6. JACKSON: Treatment of Laryngeal Stenosis by Corking Tracheotomic Cannula. THE LARYNGOSCOPE, St. Louis, 1919, Vol. XXIX, pp. 1-4.
7. LYNAH: Endoscopic Treatment of Laryngeal Stenosis. *New York Med. Jour.*, 1919, Vol. CIX, pp. 146-149.
8. LYNAH: Treatment of Stenosis. THE LARYNGOSCOPE, 1920, Vol. XXX, pp. 343-354.
9. PENHALLOW: Military Surgery, 1918, p. 392.

ENGLISH.

10. ABEL: A New Laryngotomy and Tracheotomy Tube. Proc. Roy. Soc. Med., London, 1917-18, Vol. XI, Sect. Laryng., 110.
11. DAVIS: A Case of Laryngeal Stenosis Following Bayonet Wound Treated by Intubation. Proc. Roy. Soc. Med., London, 1915, Vol. VIII, Laryng. Sect., 120.
12. DAWSON: Perichondritis of the Larynx. Proc. Roy. Soc. Med., London, 1917-18, Vol. XI, Sect. Laryng., 133.
13. HARMER: Epidiascope Demonstration of Specimens from Cases of Warfare Injuries of the Larynx. Ibid., p. 173.
14. HARMER, FRENCH, TOD: Cases of Gunshot Wound of the Larynx. Ibid., p. 176.
15. HARMER: Discussion on Warfare Injuries and Neuroses of the Larynx. Ibid., pp. 180-182.
16. HARMER: Warfare Injuries of the Larynx. *Jour. Laryngol*, London, 1919, Vol. XXIV, pp. 2-12.
17. HILL: Tracheal Obstruction Due to Long Latent Cervical Abscess Following a Wound by Shrapnel Fragment. Proc. Roy. Soc. Med., London, 1915, Vol. VIII Laryng. Sect., p. 124. (For O'Malley see p. 122 and for Stuart-Low see p. 123.)
18. HILL: Shell Wound of Neck. Proc. Roy. Soc. Med., London, 1915, Vol. VIII Laryng. Sect., p. 123.
19. JONES: Case of Gunshot Wound of the Neck; Injury to the Larynx Resulting in Formation of a Web. Ibid., p. 71.
20. MILLIGAN: A Note on Treatment of Gunshot Injuries of the Larynx Where "Webbing" of the Vocal Cords Has Taken Place. Proc. Roy. Soc Med., London, 1915-16, Vol. IX Laryng. Sect., pp. 85-87.
21. PETERS: Cases of Gunshot Wounds of the Larynx. Proc. Roy. Soc. Med., London, 1917-18, Vol. XI Sect. Laryng., pp. 177-179.
22. STUART-LOW: Case of Shrapnel Wound of the Neck and the Larynx. Proc. Roy. Soc. Med., London, 1917-18, Vol. XI Laryng. Sect., p. 179.
23. SYME: Case of Shrapnel Wound of the Trachea. Ibid., p. 177.
24. SYMONDS: After-results of Four Complete Laryngectomy Cases. *London Lancet*, 1920, p. 652.
25. THOMPSON: Officer Shot Through the Neck. Proc. Roy. Soc. Med., London, 1914-15, Laryng. Sect., pp. 125-27.

FRENCH.

26. CANUYT: Sur un cas de Laryngo-Stenose Cicatric do Guerre. *Jour. de Med. de Bordeaux*, 1920, Vol. XIII, Sect. Anesth., pp. 45—s-8.

27. CANUYT: Les Blessures de Guerre du Larynx et de la Trachée. *Jour. de Med. de Bordeaux*, 1916, Vol. XLVI, pp. 93-96.
28. GUISEZ: Les Plaies de Guerre Laryngo-Trachéales. Paris Med., 1915-1916, Vol. XVII, pp. 355-359.
29. GUYOT: Plaies de Guerre du Larynx. Bull. et Mém. Soc. de Chir de Paris, 1918, Vol. XLIV, pp. 1955-57.
30. LANNOIS: Sargnon and Daurioc, Traitement des Stenoses Chroniques Graves du Larynx par Traumatismes de Guerre. Lyon Méd., 1916, Vol. CXXV, p. 275.
31. MOURE: Gaz. Hebd. d. s. c. Méd. de Bordeaux, 1920, Vol. XXXV, p. 325.
32. MOURE AND CANUYT: Les Plaies de Guerre du Larynx et de la Trachée. Rev. de Chir., Paris, 1916, Vol. XXXV, pp. 1-82.
33. MOURE, LIEBAULT ET CANUYT: Pathologie de Guerre du Pharynx et de la Trachée. Pub. by Libraire Felix Alcan, 108 Boulevard-Saint Germain, Paris.

GERMAN-AUSTRIAN.

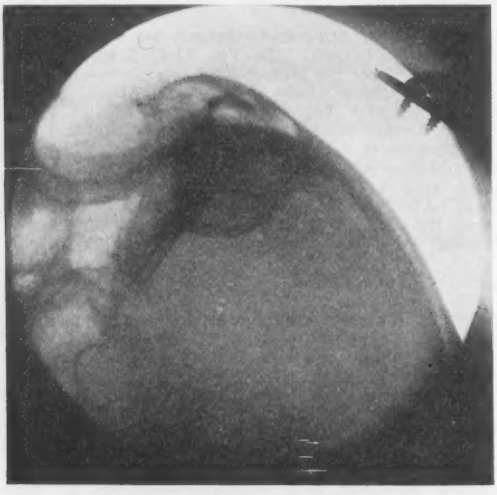
34. ALLENBACH: Kriegsverletzung des Kehlkopfes. Deutsch Med. Wchnschr., Leipsig u. Berlin, 1916, Vol. XLII, p. 1595.
35. ALLENBACH: Ueberkriegs-verletzungen des Kehlkopfes nach Erfahrungen dieses Krieges. München. Med. Wchnschr., 1916, Vol. LXIII, pp. 1464-1966.
36. ALBRECHT: Ueber Schussverletzungen des Halses. Arch. f. Ohren. Nasen-Kehlkopfheilk., Leipzig, 1915, Vol. XLVIII, pp. 138-145.
37. BRUENINGS: Ueber die Behandlung von Stenosen und Atresien des Kehlkopfes-durch Exzision. Dehnung u. Plastik, Deutsch Med. Wchnschr., Leipzig, and Berlin, 1918, Vol. XLIV, p. 534.
38. FEUDEL: Ueber Schussverletzungen des Kehlkopfes. Internat. Zentralbf. f. Ohrenheilk (etc.), Leipzig, 1918, Vol. XVI, pp. 153-9.
39. GERBER: Ueber Schussverletzungen der Oberen Luftwege u. Benachbarter Teile. Arch. f. Laryngol. u. Rhinol., Berlin, 1915, Vol. XXIV, pp. 331-346, 18 pl. Also, Berl. Klin. Wchnschr., 1915, p. 757.
40. HOFER: Ein Fall von Submukoeser Tracheal Korpel Resektion Wegen Tracheal Stenose. Monatschrift f. Ohrenheilk., Berlin, 1919, Vol. LIII, pp. 77-80.
41. KILLIAN: Kehlkopfschuesse. München Med. Wchnschr., 1916, Vol. LXIII, p. 739.
42. KILLIAN: Die Kriegsverletzungen des Kehlkopfes. Austellung d. Kriegsbeschaedigt, Fuersorge in Deutschl., Dresden, 1917, pp. 48-53.
43. KILLIAN: Kehlkopfschuesse. Beiträg 2. Klin. Chir. Tuebung., 1916, ci (Krieg Schir Hefte V), pp. 224-252.
44. KOFLER AND FRUEHWALD: Schussverletzungen des Larynx Trach. Wien. Klin. Wchnschr., 1915, Vol. XXVIII, pp. 1337-1344.
45. KOERNER: Beobachtung über Schussverletzungen des Kehlkopfes 4 Reihe. Ztschr. f. Ohrenheilk., etc., Wiesbaden, 1916, orig. Vol. LXXIII, pp. 286-294.
46. KOERNER: Beobacht. über Schussverletzungen u. andere Kriegsschaedigungen des Kehlkopfes. Ibid., Vol. LXXIV, pp. 19, 155.
47. NADOLECZNY: Ueber Schussverletzungen des Kehlkopfs. München. Med. Wchnschr., 1915, Vol. LXII, pp. 826-828.
48. OERTEL: Verletzungen u. Erkrankungen des Kehlkopfes im Kriege. Deutsch Mil. Artzl. Ztschr., Berlin, 1918, Vol. XLVII, pp. 93-95.
49. SCHUPPON: Kehlkopflaehmung durch Schussverletzung des Nervus Recurrens u. ihre Behandlung durch Kompression des Kehlkopfes. Beitr. z. Anat., Physiol., Path., u. Therap. d. Ohres, etc., Berlin, 1916-17, Vol. IX, pp. 354-369.
50. UCHERMAN: Surgical Treatment of Chronic Traumatic Stenosis, Acta Otolaryng., Stockholm, 1918-19, Vol. I, pp. 38-49.
51. VON MEURERS: Beiträge zu den Kriegschaedigungen des Kehlkopfes, Ztschr. f. Ohrenheilkunde, Wiesbaden, 1916-17, orig. Vol. LXXIV, pp. 112, 180

19 Elm Street.

MUCOCELE OF LEFT FRONTAL SINUS.*

DR. HARMON SMITH, New York.

J. M., age 53, chauffeur. Admitted to Clinic February 10, 1922. Two weeks previous to admission had had spontaneous rupture of left frontal sinus through upper eyelid. Rupture was preceded by great pain. Before this had not experienced pain, though he had been treated for a swelling over the upper lid for about a year by another doctor. Upon probing the fistula one could pass the probe in for about two inches before meeting any obstruction, and upon withdrawal of the probe a free flow of pus followed. Examination

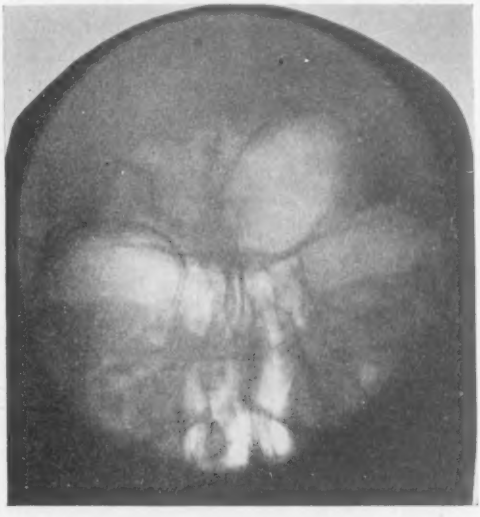


within the naris showed a blocking of the ethmoidal region with polypoid degeneration of the mucosa. *Wassermann was negative.*

X-Ray Report. Left frontal is extremely large and has the appearance as though the inner table had been pushed backwards into the frontal lobe, making a tumor mass the size of an egg. The right frontal is extremely large and irregular in outline and seems to contain granulations or pus. The ethmoids show moderately severe involvement. Both antra show moderately severe involvement Sphenoids are clear.

*Reported with presentation of case before Section of Laryngology, New York Academy of Medicine, March 22, 1922.

On February 15 I operated upon the patient, assisted by Doctor Munroe, to whom I am greatly indebted for his valuable assistance and for the subsequent care of the case. The initial incision immediately entered into a large cavity, which evacuated a quantity of foul smelling pus. Further investigation showed complete necrosis of the larger part of the anterior frontal plate. A cavity was then outlined about the size of a small hen's egg filled with thick granulations and pus. The lining appeared to be a very much thickened pyogenic membrane, and the posterior wall was approached with care, although it was found to be intact. The septum to the right frontal sinus was necrosed away and this sinus was also filled with



granulations and pus. The posterior wall of the right sinus was at least ¾ of an inch anterior to the posterior wall of the left sinus. The anterior walls of both sinuses were removed and the opening into each nostril enlarged and made continuous with the frontals by a modified Lothrop operation. No cosmetic efforts were made, as nothing normal was left to act as a sustaining wall for the overlying tissues. The recovery was uneventful. No temperature nor pain were experienced by the patient after operation. Free drainage remains into the nose, as well as a large fistulous opening externally, which will be closed at a subsequent operation, at which time some plastic effort will be made to correct the deformity. Discharge is now inconsiderable.

CASE OF PACHYDERMIA LARYNGIS.*

DR. HARMON SMITH, New York.

P. G., age 48, peddler. Came to Clinic January 6, 1922, complaining of hoarseness, severe, dry cough, increasing difficulty in breathing for one month past; so that he could not even walk upstairs. He had had no difficulty in swallowing and no pain. His general condition was excellent and he had lost no weight. About two years ago he had had a similar attack, although not nearly so severe, which lasted the greater part of the winter, and all the symptoms of hoarseness, cough and difficulty in breathing disappeared entirely in the summer. This condition of well being lasted about 5 or 6 months, and the following winter the same symptoms recurred, lasting 2 or 3 months. Then he was again free of trouble until last December, when the present difficulty began.

Examination. His nasal sinuses were negative, but there was evidence of a chronic rhinitis approaching atrophy in the naso pharynx. *Larynx.* There was great bilateral epithelial thickening of both true and false cords, obliterating the ventricles and other markings of the chink of the glottis. On the right cord there was a large, smooth, projecting mass, which appeared fibromatous. The cords could only abduct a very little. A specimen of the protruding nodule was removed, including a portion beyond the submucosa, and the pathological examination revealed an hypertrophied squamous cellular field unbroken at its limiting membrane between it and the submucosa, which consisted of loose connective tissue showing some inflammatory reaction and thin-walled blood vessels. Diagnosis, papilloma. Wassermann negative.

Treatment. Rest. Mandle solution and inter-tracheal oil injections.

Present Condition. Improvement. More space—voice and breathing better. Protruding mass more in evidence, due to reduction of surrounding epithelial thickening.

*Presented to the Section of Laryngology, New York Academy of Medicine, March 22, 1922.

THE REMOVAL OF LARYNGEAL PAPILLOMATA WITH A SIMPLE TECHNIC.*

DR. RICHMOND MCKINNEY, Memphis.

Simplicity in technic, provided it is combined with efficiency, always is desirable in surgery, and when we have a condition such as laryngeal papillomata, with a constant tendency to recurrence, and the necessity for repeated operative removal, the less formidable the operation for this purpose, the more readily is it accepted.

For some time I have been using a technic which for its sheer simplicity should appeal to all laryngologists, and as to results, I think these compare favorably with those of any other method with which I am acquainted.

The armamentarium consists of a Jackson heart-shaped laryngeal speculum, a Schmidt or Bruenings' laryngeal forceps, and a mouth gag. I have usually dispensed with any anesthetic, general or local. Most of these cases, as it is, of course, unnecessary to say, are found in young children. The child is securely pinned in a sheet, the gag inserted, the speculum passed to the epiglottis, which is elevated, exposing the larynx, and the papillomata crushed and pulled from their attachment. This can be done very quickly, and I have two or three times entirely cleared the larynx at one sitting, before removing the speculum. There is, as a rule, very little bleeding, but I always have two or three Jackson sponge carriers at hand, with gauze sponges dipped in adrenalin, so the field can be cleaned by swabbing. If the growth is extensive, the speculum may be removed, and after a few minutes' interval reinserted and the operation continued. After the larynx is cleaned out, I swab with absolute alcohol, and have the patient put to bed for a few hours, with cold cloths over the larynx.

With this method I can accomplish practically all that I can with suspension, and with far less discomfort to the patient and trouble to the operator. It is true that with suspension the surgeon has both hands free, but unless dissection of the growth or some other complicated technic is to be used, one hand for operative manipulation is all that is necessary.

Recurrence following removal of laryngeal papillomata being the rule, no matter what technic employed, to which there is only an

*Read at the Fifth Annual Meeting of the American Bronchoscopic Society, Washington, D C., May 3, 1922.

occasional exception, I am gratified at being enabled to claim success in a limited number of cases since I have been using the simple method described.

My cases total but eleven, and of these, two have entirely disappeared from my observation, for, as so frequently is true of patients from remote rural districts, no response can be obtained to communications. Of the remaining nine, eight are entirely relieved, after varying periods of time, the shortest of which is more than a year, for I would not have the assurance to claim a cure in a case under six or more months of freedom from recurrence. These patients were of various ages, but largely around four or five years. I have been fortunate in this series in not having to remove the papillomata more than twice in any given case, although this was not my experience by any means in all my previous cases, perhaps due to less thoroughness of removal in some of these.

Several of my recent cases presented rather interesting features and I am going to briefly report three of these cases.

A physician from the neighboring state of Arkansas brought his little girl, aged four, to me for the removal of a large mass of laryngeal papillomata. The child was wearing a tracheotomy tube, which she had been doing now for nearly two years without any appreciable lessening in the size of the growth.

The papillomata were removed in one sitting, and the father told to leave the tracheotomy tube out on his return home. This was done, and a year later there had been no recurrence of the growth.

A little girl, aged three, from Mississippi, was brought to me for very stridulous breathing, which she had had for some months. The glottis was found almost totally occluded by papillomata. These were removed, and the child sent home the next day. At the end of six months she was back, the growth having recurred to just as great an extent as before. Removal was again practiced. After about a similar period, I received a communication to the effect that breathing again was bad, so wrote for the child to be brought up. While her parents were arranging to do this, the child's breathing became better, and some two or three weeks later I learned that her breathing and speech were normal. There has been no recurrence.

A third case was a boy three years of age, who, in the fall of 1919, developed influenza, followed by hoarseness, which, continuing several months, caused his parents to consult a local laryngologist, who refered him to me. Two days later examination by the direct method revealed a large mass of papillomata filling the

anterior commissure. These were removed. Voice and breathing shortly were normal, and continued so for some time. The following spring, while I was East attending some meetings, the child was brought to the office with the statement that recently breathing and voice had again become bad. An associate, who was looking after my practice during my absence, sent the boy to a hospital and attempted to remove the papillomata under a general anesthetic. The breathing became so bad that he ceased his efforts and did a hurried tracheotomy. I saw the child shortly afterward, and had the tube left out of the trachea. From that time on he improved, and the last time I saw him, which was during the subsequent winter, the larynx was quite clear of all growths.

These cases present varying aspects of the problem of treating laryngeal papillomata. The first case had a tracheotomy, formerly so much advised in treatment, but after two years was not improved; the second seems a good example of the spontaneous cure that nature sometimes makes, while in the third case, cure may be ascribed to the tracheotomy, although my acquaintance with the condition of the larynx at this time was not from my own observation. My other cases were simple in character, but entirely relieved by not more than two removals.

Bank of Commerce Building.

THE TREATMENT OF SEVERE SYSTEMIC INFECTIONS OF OTITIC ORIGIN.*

Dr. E. B. Dench, New York City.

In considering the treatment of these cases I shall follow the admirable outline already arranged for this discussion. This would lead first to treatment of the pre-aural condition. Preventive measures in cases of this kind are certainly of importance. They consist in the removal of the adenoids and tonsils and attention to the proper eliminative functions of the patient and in the cases of infants proper feeding. The treatment of the aural lesion itself may be divided into the treatment of first: the acute middle ear condition; second, mastoid involvement; third, chronic middle ear suppuration; fourth, blood stream infection; fifth, infection of the brain substance; sixth, infection of the labyrinth; and seventh, infection of

*Read before the Otological Section, N. Y. Academy of Medicine, March 2, 1922.

the meninges. It will be hardly possible in the short time allotted to me to more than touch upon the treatment of these various conditions.

In the treatment of acute inflammation of the middle ear the elevation of temperature ordinarily determines the degree of systemic involvement. It is much better to depend upon the temperature as an indication for incision of the drum membrane than to depend upon the appearance of this structure alone. A middle ear may present all the evidences of severe infection and yet the organism may be of so mild a type as to cause no temperature elevation. With the exception of the infection due to pneumococcus, group three, the temperature is the indication of the amount of constitutional involvement and many cases which locally appear to need operation will recover without interference. Free incision of the drum membrane where there is evidence of suppurative involvement causing constitutional symptoms is the only rational treatment. The history of a mild attack of acute otitis with temperature fluctuations after all signs of acute inflammation have disappeared is a condition frequently met with in children. While the white color of the drum membrane is apt to deceive, careful examination shows that the tympanic cavity contains fluid, and free incision will in these cases cause a cessation of the evidences of the systemic involvement. These cases are particularly prone to occur in children.

In cases where mastoid involvement is present as evidenced by canal signs, profuse discharge or pain and confirmatory X-ray plates, the only rational procedure is a complete mastoid operation. This operation should be complete in each case and all the pneumatic structure of the mastoid should be obliterated. If the mastoid is once opened the operator should not be contented with simply draining the antrum, but should perform a complete operation in each case. I here wish to emphasize strongly against repeated incisions of the drum membrane in attempts to avoid the mastoid operation. If the drum membrane has been incised freely once, a continuation of discharge and a continuation of the evidences of septic absorption are indications for opening the mastoid. Repeated myringotomies in attempts to drain the mastoid process through the external auditory canal are worse than useless and a complete mastoid operation is a much safer procedure.

Chronic middle ear suppuration should be dealt with by the radical operation. This condition is not infrequently the cause of malnutrition, faulty development, dull headache, and sometimes epileptiform seizures. It is not necessary that the discharge be profuse or

that it be constant in order to produce these effects. A very slight discharge and sometimes a history of intermittent discharge in the presence of a partial destruction of the drum membrane is sufficient to demand operative interference provided there is evidence of systemic poisoning. I, naturally, do not here refer to those cases where the chronic suppuration has led to involvement of the intracranial structures. These will be spoken of later. I am speaking now of cases which are not uncommon, where a slow toxemia is being produced by a chronic suppuration of the middle ear which in itself may seem trivial. All of these cases should be dealt with by means of a radical operation with employment if possible of the primary skin graft. Where epileptiform attacks are present it has been my practice in these cases to expose a large area of dura even though the inner table seemed healthy at the time of operation. These cases invariably do well. The old teaching that the radical operation constitutes a grave menace to the hearing is not borne out by the experience of the speaker.

When we have evidence of direct invasion of the blood stream, this usually occurs through the lateral sinus and we must remember that such an invasion of the sinus may occur directly from the middle ear through the jugular bulb without any mastoid involvement. The temperature in these cases is usually characteristic, the daily variations in temperature being exceedingly wide. A positive blood culture of course clinches the diagnosis, but even in cases where the blood culture is negative a characteristic septic temperature should always lead to exposure of the sinus. Even this may not yield much information, as a parietal clot not completely occluding the vessel may give rise to more symptoms than a clot which completely obstructs its lumen. The logical procedure in these cases is either simple ligation of the jugular above the facial vein with ligation of the facial as well, the subsequent opening of the sinus, and the removal of any clot if present until free bleeding occurs from each extremity of the sinus, or excision of the vein with the same treatment of the sinus. My own preference is for excision of the vein excepting in the very early stages. The value of transfusion in these cases either with plain blood or blood from an immunized donor is of great value and will be dealt with by the next speaker.

Where the brain substance has been invaded whether the invasion occurs above or below the tentorium, drainage of the septic focus is naturally the only proper procedure. This drainage should be performed along the avenue of infection if possible. If the direct

avenue of invasion can not be found a two-stage operation is advisable, first exposing an area of the brain substance over the probable site of involvement and twenty-four or forty-eight hours later exploring the brain substance itself.

Invasion of the labyrinth demands great judgment on the part of the surgeon. If convinced that the invasion is of the purulent type immediate extirpation of the labyrinth is the proper procedure. We must remember, however, that in some cases the labyrinthine changes do not necessarily mean an actual infection of the labyrinth itself. It is wise, therefore, in cases where the labyrinth symptoms are of a mild character to wait for a short time before the radical procedure of labyrinth extirpation, as in some cases the process limits itself entirely to the labyrinth and although the structure may entirely lose its function the patient may recover without operation. The severity of the infection and the cell count of the spinal fluid taking into acount the nature of the infectious organism are points to be borne in mind in determining the necessity for operation. In rare cases the blood stream may become infected through the labyrinth, although these cases are rare.

Infection of the meninges is always a serious condition and must be dealt with promptly. The meninges may be invaded through the labyrinth or through the dura in the middle fossa, through the lateral sinus or through the blood stream itself. Unfortunately operative procedures for these conditions are usually unsuccessful. The plan which has met with most success at my hands has been first to remove the primary focus, that is either by a mastoid operation or radical operation as the case may demand. If invasion occurs through the labyrinth, removal of the labyrinth with drainage at the internal auditory meatus is indicated. Certain cases have recovered after removal of the septic focus and exposure of a large area of dura in the middle cranial fossa, particularly those cases in which the spinal fluid although under pressure does not show pathogenic organisms. Removal of the primary focus, exposure of a large area of dura and also lumbar puncture to relieve the intracranial presure is the plan of treatment which has met with the greatest success not only at my hands but at the hands of others. A decompression operation and ventricular drainage should be reserved for the very severe cases but these measures are frequently inefficacious.

15 East 53rd St.

METHODS OF MENTAL RECONSTRUCTION OF THE DEAFENED.*

DR. HAROLD M. HAYS, New York.

There are times when the physician must stray from the fields of medicine and delve into psychological realms. His care of mental conditions must be as perfect as his care of physical conditions. I do not mean to infer that the majority of deafened patients are mentally inferior in any way or are to be classified among the mentally unfit; but all of us must agree that the majority of them, until they have been made to see the light, think wrong and when they think wrong they do untold harm to themselves and give others around them no opportunity to help them.

I can do no better, to make one understand the deaf person, than to cite the history of a specific case which fits in so well with the histories of thousands of other cases. About forty years ago, a baby girl was born in a small town in New York state. I have known her almost from the day of her birth. She grew up to be a happy child, with the most lovable disposition, and everyone predicted a happy future for her. During her girlhood, she was very popular and everyone thought that she would marry well. During her childhood, she had the usual diseases and there seemed to be no aftermath. When she was about twenty years old, she began to notice that her hearing was defective and consulted the otologists who were at hand. She was told that she had a catarrhal deafness which necessitated continual attention. Her ears were inflated and numerous operations were performed on her nose and throat. At one time, about fifteen years ago, when her hearing was decidedly impaired, but not to such a degree but what she could go on with her ordinary pursuits, she consulted a doctor in New York City, not a specialist, but a man who dabbled in every field of medicine, who endeavored to give her treatment with the result that, at the end of a few weeks, her hearing was so much worse that she became very despondent. Since that time, she has traveled from one specialist to another, myself included, until at the present time, her hearing is so markedly impaired that she finds it impossible to take part in any mixed conversation. If she is alone with a person in a quiet room, she is able to hear fairly well but if she is sitting at a dinner table where a number of people are talking, she crawls into herself and makes no effort to find out what is going on about her. Naturally, at the end of such an evening she is tired, the next day her nerves are on the ragged edge and her hearing is decidedly worse.

*Presented before the Society of Progressive Oral Advocates, June, 1921.

During the past ten years, this lady's disposition has changed. She is no longer the sweet girl she was and she realizes it. She has had many opportunities to marry but she has given up the idea of marriage for a number of reasons. In the first place, she feels that she is a handicap to any man; in the second place, her mother and father were first cousins, a number of sisters and brothers have been mentally defective and she is afraid she might transmit some stigmata of degeneration to her off-spring. She has dabbled in various kinds of work to keep her mind active—work which she could, no doubt, do successfully if it were not that her thoughts are constantly upon what she considers the worst ailment from which anyone could suffer—deafness. And now at the age of forty, she is considered by her male friends as a negative type, with a sensitive personality, who cannot be intimately approached. To her female friends, she is sweet and thoughtful but they never think of her as the type of woman who could be of service to mankind.

In her present state, it is impossible to do anything for this girl. No one else can help her because she refuses to help herself. It is not difficult for me to analyze this patient because, on and off, she has lived in my home. And I have had the opportunity to study her closely. You can well understand that I have talked to her frequently about her ailment and what the possibilities were for her to improve herself, both mentally and physically, if she would take my advice. But she literally and figuratively turns deaf ears to me whenever I mention the subject.

My conversations with her have run something like this: you are unable to hear well and you must be philosophical enough to appreciate this fact and look life squarely in the face. There is nothing medical which will help you. But there are a number of ways in which you can be benefited. In the first place, you must learn to smile. In the second place, you can be immensely benefited by taking up lessons in lip-reading. In the third place, you are straining your nervous system to the breaking point. You never give yourself a chance to relax. Your nerves are readily fatigued. Your auditory nerves are not getting any exercise. Relax and smile.

On one occasion, she was at the dinner table with my wife and myself. I mentioned that it would help her a great deal if she would use a hearing device, if only when the three of us were together. I finally persuaded her to use a phone at the table with us, just to try it out. She admitted that she could hear perfectly with it and I am sure that, for the time being, her nervous system relaxed more

than it had for years and I am very sure that my wife and I were considerably relieved because we could speak to her in a normal tone. But, when I tried to persuade her to use a hearing device at theaters and lectures, she remarked, "I would rather die than wear one of those instruments." Why would she not wear an instrument? Mainly because she felt that everyone, then, would know of her hearing defect. It was impossible to make her appreciate the fact that everyone knew that she was hard of hearing. She was even foolish enough at times to try to answer questions which she did not hear and these answers, having nothing to do with the questions, made her, often, appear foolish.

I have dwelt at length on this particular case because it is the history of so many deafened people who refuse to take advantage of those aids which we feel we are now in a position to furnish them. How sad is this girl's life in comparison to that of a hopelessly despondent girl, who at eighteen years of age, had to earn her own living and who, by sheer will and determination, had re-made herself until she was able to fill a responsible position.

Now what can be done for the patient who has worried herself into a listless mechanism which merely exists because it cannot die from its infirmity? The problem of the care of this individual is both a medical one and a social one.

The medical problem may properly be divided as follows:

1. Medical treatment.
2. Psychological analysis.

1. For the purpose of mental reconstruction, one must realize that deafened individuals belong to two classes—those who can have their hearing improved by medical means and those whose hearing is so badly affected that we have no means at hand, at present, which promise any relief. The former class of patients deserve to have anything done for them which we feel will conscientiously help them. Perhaps, in the past too much has been done along empirical lines, with the result that such patients feel that their hearing has been made worse instead of better. But purposeful treatment, after a complete analysis of the local lesions, may make just the difference between the happy individual and one who looks at life from its darkest side. I have frequently remarked that these patients will go from one doctor to another, regardless of the lack of benefit they have previously had. What the conscientious physician will do, is to explain to them exactly what the status of their ailment is, that the condition may possibly be arrested by the employment of simple treatment given at regular intervals and perhaps even a slight improvement may be attained; but that, in any

event, the patient is better off in the hands of someone who can understand his ailment intimately than by running indiscriminately from one physician to another. I have at least a dozen patients under my control at the present time, who have allowed me to advise them over a period of more than ten years. Their hearing is at least as good as it was ten years ago, and in some cases, it is far better. I have not contented myself with looking at these cases only from the point of view of giving them local treatment. Moreover, I have seen that they have kept their general physical condition up to par, so that no intercurrent infection might take place which could markedly affect their ears.

It is frequently the duty of the physician to keep the hopelessly deaf patient under his control, too. Such patients do not expect any improvement in their hearing but there are times when they feel that their ears would feel lighter, as they put it, if they had some local treatment. Moreover, many of these patients suffer from head noises which sometimes can be made less nerve racking by proper medical care. The treatment may only be of use in so far as to make the patient feel better satisfied for having something done for him than nothing at all. I have one patient who feels that his ears become blocked at certain times, so that he is sufficiently distressed to be unable to attend to his work. One or two treatments changes his mental attitude entirely and he is immensely benefited.

2. No mental reconstruction of the deafened patient can be accomplished without a proper psychological analysis of the case. There may be some individuals who are deaf and remain cheerful without using anything to improve themselves, but they are few. During the time of the first examination, the physician can approximately come to the conclusion as to the kind of advice which will be of most benefit. The first thing to do is to get the entire confidence of the patient. Until that is attained, nothing can be accomplished. I have found that most of these patients are suffering from some devitalized condition. Their mental, nervous and physical systems are all affected. These patients are extremely introspective and are continually dwelling upon their troubles and feel resentful toward the rest of the world. The problem in mental reconstruction is:

1. Auto-suggestion.
2. Advice as to the immense benefits of lip-reading.
3. The use of a hearing device.

1. I have been most impressed with the fact that the deaf person has to learn a new philosophy. It is difficult for him to gain a broader view-point and oftentimes, the only way he can do so is to

study himself and keep on mentally suggesting those thoughts which will make him look at his infirmity more cheerfully. Auto-suggestion is really the foundation of Christian Science and other cults of a similar nature. It takes a firmer will power to adopt a personal religion but it can be done and has been done any number of times. In a short paper called "A Doctor's Philosophy," published within the past year, I told how I had auto-suggested to myself. I shall quote a part of it:

My philosophy was very simple. First, no matter what happened, I had to get out of bed on a cold, dismal morning with a smile on my face—that is, get out of a couple of blankets with my clothes on. (This was in France.) So, as soon as I got home that day, I wrote out a set of commandments which I learned by heart. I won't tell you all of them, but here are a few:

This is a beautiful day. (This I would say as I got out of bed in the early morning when the air was still chilly and I had a heavy taste in my mouth. Register smile.)

The world is good to live in. (I would say this most often when a boche shell was trying to get me.)

There is always some fellow worse off than I am. (I would say this when I saw a fellow trying to drown himself in booze.)

This has been a wonderful day. (Said at night when I crawled into blankets again, to warm my socks.)

I said these commandments day in and day out, until I was happier than I had ever been. And, now that the war is over and I am home again, I find myself still saying them. My attitude toward life has changed; I find that life is more than worth while living because my philosophy is founded on cheer.

Now how does all this apply to the deaf? No class of people that I know of, are so introspective and shrink more from their fellow men than the deaf. They are alone and left alone because they feel that they are not as others. It's all wrong. Life will be for them what they themselves make it. Why should they not try a little auto-suggestion?

And I conclude the paper by setting forth the following ten commandments for the deaf which I ask them to learn by heart and to keep on saying for one month. These are the commandments:

1. I shall always smile.
2. What my ears don't hear, my eyes shall see.
3. I am no worse off than others. I might have tuberculosis or cancer.
4. I shall do my work willingly so that all can see that I work better than my hearing brother.

5. I shall mingle with my fellowmen with my head up in the air.

6. I shall look each man in the eye and put a decent value on myself as a member of society.

7. The world does not owe me a living while I sit idly by for the word to come to me.

8. A deaf man can be President of the United States. To try to be as big as that, will help me to be bigger than I am.

9. I have the will to do. Why not do it?

10. It's what I think, not what I am, that will make the world recognize my worth.

At the time of writing these commandments I had little thought of the immense amount of good which their impression would make on the despondent deaf person, who comes to me, goes away without a word of cheer and a definite determination to auto-suggest to himself according to the advice given above. The change in these people has been truly marvelous. One little girl, with whom no one was ever able to do anything, and who had become so nervous that she could not hold down any job is now happy in a clerical position. One may call this mental exercising pure humbuggery but the truth of the matter is that everyone knows how easy it is to become really ill through mental suggestion and so it should equally hold true that one can mentally suggest to keep well. How often do we see deaf people who, coming upon a sudden joy, become so mentally alert that no one would recognize their deafness; and conversely, how often do we see those same people hopelessly deaf through a sudden grief! The great value of continual auto-suggestion lies in the fact that the conscious mental effort finally gets into the subconscious or subliminal mind and remains there permanently.

2. It is needless for me to dwell upon the great value of lip-reading to an audience of this kind. Many of you are lip-readers (or as I prefer to call it, speech readers) or else have taught lip-reading. But unfortunately, the medical profession, are just beginning to appreciate its value, mainly due to the efforts of such men as Dr. Max A. Goldstein and Dr. Wendell C. Phillips whose interest in the deaf will never be forgotten. I wish it were possible to get every otologist in the country out here so that he could be given an actual demonstration of what lip-reading can do. In a number of papers of mine, printed in medical journals, I have pointed out what lip-reading means to the deafened and I never hesitate to advise its study, as soon as marked impairment in hearing is evident. In the "Medical Times," about four years ago, I said as follows:

"I believe that the otologist can accomplish a great deal more with many of his deaf patients if he insists that they learn lip-reading at the same time that they are taking their treatment or before they undertake treatment. Unless one is placed in the position where he comes in contact with many lip-readers he cannot appreciate the great benefit of lip-reading. When it becomes an effort to hear, when the nervous system has to be kept at the greatest tension all the time in order to understand what is being said, the nerves finally wear out and the patient lapses into a state of semi-lethargy. Once a person is taught to read the lips by the scientific methods advocated by the great teachers of lip-reading, the horizon clears and he again feels that he is a responsible individual, who counts in the affairs of men.

"The schools for lip-reading managed by competent men and women are doing a great work, which can be appreciated by the deaf only when they are made to understand that the deaf man substitutes lip-reading for a defective ear in the same manner as the blind man educates his fingers to take the place of his eyes."

In mentally reconstructing the deaf I have placed auto-suggestion first and have placed lip-reading second. My reason for doing this is that no one can take up lip-reading and be successful in reading the lips without first altering his state of mind so that it is sufficiently acute to master this new language. In a way, lip-reading is but another form of auto-suggestion, because the deaf person is constantly encouraged by being able to understand in a far keener way. The value of the association centres in the brain cannot be overestimated. Not only is the patient able to understand better because he can read the lips but because the constant interdependence of communication between the auditory and visual centres, makes it necessary to use his auditory nerves more than formerly. The physician may not be able to measure this increased acuity of hearing by the ordinary tests. The increase in hearing may be more mental than physical. This makes little difference to the patient. He knows that he hears better, feels better and is able to get along better, in his communication with his fellowmen, than he did before.

3. What we are striving after in our mental reconstruction of the deafened, is to place them in a position in which they are able to communicate better with those around them, for economic or social reasons. I am putting it this way because hearing devices are more commonly used by deafened individuals who need their hearing for economic reasons (and therefore they are used more by

men in business) and lip-reading is used more for social reasons (and therefore is more popular and undertaken with more seriousness by women than by men). Regardless of many comments to the contrary, a suitable electric hearing device is a great aid and should be used by everyone who finds that he is able to save his nervous energy by doing so. The hearing device is of benefit in two ways—it actually is an aid to hearing and secondly continuous vibration on the ear drum sets up a certain amount of local massage. Again it is necessary to attune the mind of the deaf individual to the use of an instrument. Much as there is a prejudice against them at present I have no doubt that, in the course of time, their use will be so common that they will be no more noticed than eye glasses. I shall not be content until I see the majority of deafened patients reconciled to the fact that they must use some form of hearing device in a theater or in a lecture hall. At such times, attempts to read the lips are almost without success unless the hall is well lighted.

In our task of mentally reconstructing the deafened, it is often necessary to re-fit them for their economic and social life. For example, a man who has been a salesman all his life, cannot hope to be a successful salesman after his ears refuse to allow him to hear accurately what his customers are saying to him. There are many other fields in whch he can become active. What the right field is for the individual man, it is hard for me to say. But let me cite the case of a man, who had been a polisher in a piano factory, who became hopelessly deaf. We found that he was an excellent worker on all kinds of furniture and the result is that he now has a prosperous upholstery business and has more trade than he can handle. Many times, individual advice can be given by the physician but in most cases, the problem is better handled by one of the existing Leagues for the Hard of Hearing. This reminds me of the fact that the placement of hard of hearing employes is not a difficult matter, if the work is in the hands of a competent individual who knows how to go after the jobs. Once the employer appreciates the concentration with which the deafened individual can work, he is more than willing to place a second worker if he has room for him.

The social problem is, often, a most difficult one. Again we must fall back on first principles and realize that the deaf individual is his worst enemy. He is no longer of any use to the community or to himself until he puts himself into a receptive frame of mind. It is wise to try to meet this problem individually, but in the majority of cases, the patient must be referred to one of the agencies which

are constantly striving to better his lot. I wish I had time to tell you all the good that can be done in this way. Once a particular patient sees that someone who is worse off than he is, has been able to make something of his life, it is easier for him to feel that there is some possibility for him to fit in. I have been much interested in co-ordinated effort, with the result that our New York League for the Hard of Hearing has been the model for Leagues of a similar character throughout the country. Here our work divides itself into various departments—welfare, employment, educational and hardwork shop. The various departments have kept in mind the absolute necessity of mentally reconstructing the deafened so that their association with the League, has meant eventual happiness for the members and those by whom they are surrounded. Their horizon has been so expanded that most of the members have been intermutually helpful. The broadening of intelligence has meant the elimination of prejudices among themselves, until each member points with pride to the wonders that he has been able to accomplish.

Ten years ago, I handled the problem of the deaf from the same narrow view-point with which the problem is handled by many today. But I have seen the light. It matters not to me (and it should not matter greatly to the deaf person) that the public is not in sympathy with the deaf man. It matters not to me that I am up against almost insurmountable difficulties because of the prejudices of the deaf themselves. It matters not that the problem is becoming more of a psychological and social one than a medical one. What does matter is that at least a few of us, who are vitally interested, are beginning to see results from the proper handling of these patients.

In conclusion, let me voice the feeling of all those who are here today. Realizing as we do, the absolute necessity of educating the deaf and the responsibility of the public toward the deaf, there is no more important part of our work than reconstructing the mentality of the handicapped individual so that he is able to reap the benefits of the multitudinous opportunities which are placed before him.

2178 Broadway.

INTERNAL PHASES OF OTITIC INFLAMMATIONS.*

Dr. Harlow Brooks, New York City.

It is very difficult for the average internist to properly discuss this subject since few of us are sufficiently familiar with otitic inflammations as they occur in large otolgical services. For the greater part we see the otitic inflammations as they occur as complications in general diseases. As I shall point out later there seems to be quite a definite distinction between these two phases of the process. It is only the general practitioner of large experience, a particularly rare and unusual "specialist" now-a-days, or the consulting internist to an otological service who is brought in contact with a sufficiently large number of cases of essential otitic inflammation to speak with authority on its internal phases. It has not been my fortune to have occupied either of these positions, though rather the former than the latter, hence I have no doubt but that the remarks which I have to make will be considered, and rightly so by the otologist as not correctly expressing the condition as he sees it for I must speak from my own personal experience and this has been almost exclusively with cases of otitis which have developed as complications in the course of general diseases, particularly with cases which have occurred in scarlet fever, measles, the pneumonias, influenza, bronchitis, septicemias, and to some extent in typhoid fever.

Were I to attempt otherwise, I should be forced to copy from the literature on the subject almost exclusively, and taken from this phase, there appears to be but an astonishingly meagre literature in which otitic problems have been discussed from the internists standpoint. With this initial apology and confession I shall then proceed.

I find it very convenient as I review my experience with the otitic complications in internal disease to divide my cases into two general classes. (a) those which conform to the general rules which pertains in most focalized infections as abscess formation or in the general diseases, that is insofar as symptomology and general physical signs are concerned and those which, (b) fail to so conform. I think that most clinitians will bear out my experience that the second or "non-conformist" group is by far the more frequent. No matter how well we may be aware that otitic inflammation is likely

*Read before the Otological Section, N. Y. Academy of Medicine, March 2, 1922.

to appear in any given general infection as in scarlet fever or measles, no matter how carefully we may study our cases for the development of this complication, still all of us find that unexpected pus stained pillows will occur in our best observed services, and routine autopsy examination of the ear and mastoid, in our fatal cases will show signs of omission.

As I have already intimated typical signs and symptoms, that is fever, perhaps chill, leucocytosis, tachycardia, asthenia and the like are much more likely to appear in cases in which as it were the otitis springs up de novo, together with the typically localizing pain than they are to develop even in the afebrile stages of such diseases as convalescent scarlet fever, in measles or in the pneumonias. There is a very interesting theoretical explanation which may be taken as explanatory of this clinical fact, but I am trying to avoid theorizing tonight and to limit myself definitely to the clinical phases of this question.

I think that it has been noted by most internists that as a rule otitic inflammations most frequently appear in the later or convalescent phases of the general infections rather than in the earlier days of the disease. It does in truth then seem to be in part an evidence of lowered resistance, this is again indicated by its relatively greater frequency in nephritics in diabetics and even in chronic cardiacs. In other words the complication appears to be favored by lowered general resistance from whatever cause.

So very frequently is the appearance of absolutely unheralded otitic inflammation in internal diseases, particularly in the septicemias without either general or local signs or symptoms, that the astute internist has learned to search particularly those cases in which it is likely to occur as a matter of routine. During our epidemics of measles, scarlet fever and of pneumonia at the Base Hospital at Camp Upton during the early days of mobilization at my request an otologist was detailed to my medical service and he was required to record each day positive or negative findings on each bed case on the service, notwithstanding this precaution many unexpected cases of suppurative otitis occurred.

So very infrequently are alterations in temperature, pulse rate or in the general manifestations of an afebrile process altered in any way by the development of an otitic inflamation that the internist as a rule looks for localizing symptoms of which of course pain is the most striking. There is still another sign which is of very great importance for the internist and that is alterations or defects in the hearing of the patient, especially when it develops

suddenly. We all know nonetheless how very frequently it occurs that instead of definite pain, loss of hearing and the like the complication develops without complaint on the part of the patient and a ruptured drum with the abundant discharge of pus is the first sign which is detected. This last condition was so very frequent in the epidemic of influenza and pneumonia in the A. E. F. during the winter of 1918-1919 that attention was called to its frequency in orders from the Chief Surgeon's Office. In a review which I made of the protocols of all the cases in the Expeditionary Forces which died of pneumonia I was particularly struck by the very great frequency with which purulent otitis media and even mastoiditis and its complications had occurred during the epidemic. Many of the cases had failed to perforate but had extended into the mastoid and search of the history, of the temperature chart and of the bedside notes gave no clinical suspicion of the lesion having existed.

Even the most assiduous attention in the infections in which this process occurs will fail to detect many such instances. I recall particularly an instance of confluent broncho-pneumonia occurring in a very prominent man, in whom because of his prominence the family physician and I felt it wise to ask for the assistance of an otological diagnostician because of the frequency with which this complication was then occurring in such cases. Nothing whatever in the blood count, in the temperature, or in the complaints of the fully conscious and very intelligent patient had led us to diagnose or to even suspect an otitis—we were acting only because of the type of the infection and from the convenient law of probabilities. Instead of one we finally called two of the most competent and best known otologists of this city. Both pronounced the ears entirely normal yet within two hours after the consultation one ear drum had spontaneously ruptured giving exit to a very abundant purulent discharge. The other drum was incised the next day.

I saw two weeks ago in consultation with the otologist and internist of a suburban hospital the case of the head nurse, who a diabetic had been confined to bed because of a mild influenzal attack in the course of which a sinusitis had developed. She had suffered for years from a chronically discharging ear and the diabetis of which the patient had been alone aware had endured since some ten years. Mastoid infection was suspected because merely of local signs. No fever was present, no leucocytosis, no disproportion in the differential leucocyte count, the blood cultures had been negative, no symptoms indicative of mastoiditis were made out but the X-ray indications of a mastoiditis were positive. Because of

the diabetis the otologist held off operation until urged by the internist to proceed. He found an extensive mastoiditis and the only positive indication had been the X-ray report. Such are not exceptional, but frequent cases.

Thus far, as you will remark, I have spoken mostly of the lack of systemic symptoms occurring in the otitc infections—I believe that these instances are the rule rather than the exception. This is particularly the state of affairs when the otitic infection occurs as a complication in the general diseases which customarily fall to the care of the internist. Briefly my point is that because of the frequent lack of systemic signs and manifestations, diagnosis or detection must depend chiefly on the consideration of the law of probability and on the local signs and symptoms of otitic inflammation which lie within the domain of the specialist or of the well prepared general practitioner.

Where otitic inflammation occurs as it were, de novo, independent of general afebrile conditions or during the afebrile periods of convalesence, one usually finds that the otitic process is inaugurated with a temperature which except in rapidly extending cases soon takes on the characteristic evening rise and morning fall usually seen in ordinary infections. Chills when they occur usually indicate extension either to new areas of adjacent tissue or a generalized infection, that is a septicemia. There is nothing in so far as I can determine in any way characteristic in this process differing in any material way from the similar reaction occurring in other infected foci. Persistance of temperature however not only indicates persistance of the process but further extension as a rule and with this a lack of proper surgical drainage—a persistant temperature in these cases means to me either an extension of the process or an inadequate drainage in case rupture or operation has been accomplished.

The blood study in case of otitic inflammation for their correct interpretation must take into full cognizance the existance or absence of other or general inflammatory processes. Where these are present, the blood picture is of little or no distinctive diagnostic value. When it is possible to exclude other foci or infection and where the nature of the process in which the otitic inflammation develops does not of itself cause a leucocytosis as in cases of typhoid fever or in influenza, the presence of a leucocytosis with otitic symptoms is of great importance. When the process is purely otitic even in instances of influenza the leucocytosis is of the polynuclear variety. Its degree is to a certain extent a measure of the activity

of the infection, though also in part determined by the reaction of the body tissues against the process.

Practically the same may be said of blood cultures. One must not at once jump to the conclusion that because bacteria are detected in the blood stream of cases in which signs and symptoms of otitic inflamation are present that therefore the otitic process is soley or even chiefly accountable for this septicemia. My autopsy experience has shown me that more than frequently an endocardial infection is also present. Of course prognosis is not definitely changed by this fact, nor should in my opinion treatment be materially altered by such a finding, but the fact remains that in my experience it is usual at autopsy to find in such cases other foci of infection beside those directly attributable to the ear inflammation. Otologists are perhaps quite as likely to forget this fact, as internists are that grave otitic inflamations may exist without any save special signs and symptoms.

It has been my observation that metastatic lesions occur in the serious otitic inflammations chiefly by extension, rarely by the direct haemic or lymphatic route except in instances such as sinus thrombosis when the course is precisely similar to that seen in any other septic thrombotic process.

To summarize: I wish to repeat that systemic manifestations are often entirely wanting, even in severe otitic inflammations. When present they differ but little if any from those present in any other similar focal infection. Their character is in most part determined by the symptoms of systemic infection and must never be used in a negative diagnostic sense. Diagnosis is essentially a question of special signs and symptoms.

Blood studies must always be considered in the light of the general process in which the otitic inflammation has developed. Positive blood findings must be always considered in relation to the probability of concomitant or primary infectious foci existing elsewhere—they are rarely determined by the otitic process alone.

Metastasis usually takes place by extension. When through haemic or lymphatic channels, thrombosis or other foci may be strongly suspected.

MASTOIDITIS ASSOCIATED WITH ACUTE NEPHRITIS.*

Dr. Carl M. Sautter, New York.

Mastoiditis associated with an acute nephritis has been so little discussed, the writer submits the following three cases to emphasize the importance of albumen in the urine and the necessity of analysis when treating doubtful cases of suppurative otitis.

The presence of an acute nephritis must be considered in diagnosing a case as ready for operation. The presence of blood cells and albumen in the urine is significant of deteriorating influences in the kidney. Whenever this condition exists it is due to one of two routes of infection: either the metastatic circulatory or better said the descending route, or, secondly, the ascending route by the bladder. Pre-existing foci in the body are often the insidious or precipitous etiological factor. This depends on the virulency of the infective organism; drainage established at the source and the degree of renal stasis. The kidney transmits and eliminates bacteria very much the same as the liver, spleen and intestines and is liable to damage either through the organism or the toxic products. The starting point or the primary infection is extremely variable. Renal inflammations have been known to follow furuncles, felons, tonsillar and dental infections, and with the report of the following cases the writer would like to add the mastoid.

Case 1. Mrs. L. L., admitted to the hospital February 19, 1919, with temperature 103.4 F., with all the fulminating symptoms of a mastoiditis of the left side. The mastoid bone was extremely broken down with a peri-sinus abscess. Examination revealed a streptococcus infection. The routine hospital examination showed the urine to be heavily loaded with albumen, red and white blood cells and casts. The following day her face began to swell and the third day the edema was so marked, especially on the left side of her face, as to close the eye, and the temperature shot up to 104 plus. In view of the history and the peri-sinus disease a blood stream infection was suspected. The blood culture, however, taken at this time was sterile, and the optic nerve showed no inflammatory changes. The Michel clips, which were used for the closure of the wound, were removed at this time. The release of these caused a decided improvement in the edema. The operator has noticed this tendency

*Read before the New York Academy of Medicine, Section on Otology, May 12, 1922.

to edema on the same side in a number of mastoid cases when the clips have been used, and it has frequently caused many anxious moments to both the patient and relatives. Complicated by nephritis the edematous eyelid always presents itself so that it has been the writer's custom to remove almost all the Michel clips after the first twenty-four hours. In one week's time the urinary symptoms had gradually decreased to no blood and only a slight trace of albumen. In three weeks the kidneys were functioning normally, and the mastoid completely healed.

Case 2. Miss L. F., five years, referred to me April 24, 1919, with three weeks' discharge in both ears, temperature 101.2 per rectum. Child appeared poorly nourished and of sallow complexion. Her appetite was poor, she refused food, but played during the day as usual with rest of the children. There was no history of insomnia, no pain or tenderness over the mastoid. The right aural canal appeared slightly contracted. Examination of the urine revealed casts, numerous blood cells and a very heavy precipitate of albumen. Immediate operation was advised with the report of the urinary findings. The family physician, however, advised delay because of the acute nephritis. A double simple mastoid was done, both mastoids showing some pus and necrosis, especially in the supra sinus fossa. In 48 hours the urine had shown a decided improvement, with absence of blood cells and continued to improve to only a trace of albumen at the end of 7 days. In 18 days the specimen was perfectly normal, and in six weeks the child had shown a gain of 15 pounds in weight.

Case 3. Robert G., 8 years, was referred to the writer February 28, 1922. Following the measles he developed an acute suppurative otitis media of the right ear. This was incised twenty-four hours from the onset. Ten days later, when seen, the patient had absolutely no pain, slept well, and seemed to be quite normal, except that the discharge continued profuse and pulsating in character. The following day his face and feet began to swell. The urine examination showed a great number of blood cells, casts and albumen. His temperature was 99° F. X-rays showed an increased cloudiness of the right mastoid, but no breaking down of the bone septi. Culture of the discharge revealed a streptococcus hemolyticus infection. Because of the complicating nephritis an immediate operation was advised and performed. A small amount of pus was found, but especially diseased granulations in supra sinus fossa and post sinus cells. The mastoid was extremely hemorrhagic in character. A culture was taken from the mastoid cavity at this time and the

microscopical examination showed streptococcus hemolyticus. The edematous condition of the feet improved in twenty-four hours and the facial edema cleared up entirely in five days. The urine began to show a change at this time from boiling solid to a very heavy cloud. The packing was removed on the fourth day, and because of extreme sensitiveness of the patient hydrogen peroxide was used to facilitate removal, as the gauze was still fairly dry and adherent. It might be well to say now that it is the practice of the writer to allow dressing to remain four or five days and even six days until softened by the mastoid secretions, but because of the pyelitis the dressing was removed at this time. The following day there was considerable redness about the mastoid wound. There was much pain and a rise in temperature to 104 F. A fair sized area of dura and lateral sinus had been exposed at the time of the operation, so that a blood stream infection was to be suspected. A blood culture taken was sterile, white cell count of 16,000 and poly count of 61 per cent. A rash appeared over the body in twenty-four hours later, typical of scarlet fever. It is quite possible that the use of hydrogen peroxide disseminated the streptococcus so as to cause what Osler described as a surgical scarletina. The temperature subsided to almost normal and the rash faded at the end of five days, but in spite of this the renal findings continued to improve to the point of a faint trace of albumen and very few red and white blood cells. He then developed an acute articular arthritis in the shoulders and legs and another rise in temperature followed, and some swelling about the neck, characteristic of a deep cervical abscess. This presented itself just below the mastoid wound. Urinary findings again became extreme and after a consultation with two eminent internists, the patient was again removed to the operating room and drainage extended to the neck beneath the sterno mastoid muscle, where a collection of pus was found. The tonsils being large and suspicious were also quickly removed at this time. For two days the discharge from the neck wound continued profuse and the urinary findings continued bad. A Dakin's tube was then inserted and a nurse instructed to instill Dakin's fluid every hour, so that within twenty-four hours there was another decided improvement in the urine examination. Rapid resolution then took place and the patient left the hospital with still a trace of albumen and a few red and white cells. It has been the privilege this day, one month later, to again see this case, and find the ear without any evidence of suppuration either in the canal or from the wound, and the hearing is 20/20 for moderate whisper. The urine today is very light amber with still a trace of albumen. His general physical appearance is good.

The first and the last cases were interesting because of the simulating symptoms of a sinus thrombosis; the first due to the stasis produced by the Michel clips and the latter because of the surgical scarletina. All three cases were of streptococcus infection, and all three patients had a three weeks' discharge. The clinical symptoms in the first case were conclusive for operative interference. The last two were border line type, but because of the extreme renal disease immediate operative interference was advisable.

The general practitioner frequently considers the delay of the operation more advisable, but this conception, I believe, is erroneous, and it is the duty of the attending aural surgeon to insist on immediate operative interference whenever the kidney condition manifests very acute symptoms.

It has been suggested that ether anesthesia is contra-indicated, but in all three of these cases this form of anesthesia was used, and did not seem to exacerbate the symptoms. The last case one month following the acute exacerbation still presents some inflammatory symptoms of the kidneys, but shows a decided gradual improvement. Statistics gathered of kidney infections from other sources of foci show the time required for complete resolution is variable and ranges from two weeks to three months. The writer wishes to emphasize the importance of more frequent urine examination in suppurative diseases of the middle ear. It is ridiculous to suppose that the mastoiditis follows from kidney infection, but as it is quite obvious from the report of these three cases it is secondary to that of the mastoid.

11 East 48th Street.

"ONE CASE ROUND CELL SARCOMA AND ONE CASE ADENO-CARCINOMA OF THE PARA-NASAL SINUSES."

Dr. Margaret F. Butler, Philadelphia.

May 2, 1921, Mrs. K. H., 69 years of age, was referred to Dr. Warlow's clinic at the Woman's Hospital by Dr. Berta Whaland of Bridgeton, N. J. She gave the following history: One year ago she noticed a slight bloody discharge from the left nostril, with blood-stained material in the sputum. This continued without other symptoms for three months. About four months later, she noticed swelling and tenderness at the inner angle of the orbit, accompanied by soreness and swelling on the left side of the nose. The left eyeball was pushed outward. She was annoyed, not by pain, but by double vision and by the tears draining over her cheek. During the past two weeks she had had a dull pain in the frontal region over the left eye and obstruction of the left side of the nose.

Examination: Bony swelling at the inner angle of the orbit. Eyeball pushed forward. In the left naris a smooth, hard, bony growth filled the chamber to the limina vestibuli. The appearance was like that of a bone cyst.

X-ray report: Extensive clouding of left frontal, ethmoidal and maxillary sinuses. The maxillary is especially dense. Right clear. On account of the density on the left side, unable to give a more definite report on the left side.

May 6, patient was admitted to the Woman's Hospital, where under a local anesthetic the intranasal growth was explored. It proved to be a thin-walled bone cyst, containing a mass of soft, bloody, grumous tissue, about two ounces of which were readily removed with a curette. On introducing the finger the maxillary sinus and the ethmoids were easily penetrated. These cavities were cleansed as thoroughly as possible with curette and forceps.

Dr. Berta Meine made the following laboratory report: Small round cell sarcoma, spaces well filled with blood.

On account of the patient's age, we questioned the advisability of doing a radical external operation upon her and her family preferred that we should not. The tumor at the inner angle of the orbit began to diminish after the first curettement.

As the nose rapidly refilled, we recuretted, removing solid masses with the snare.

In consultation we decided to refer the case to Dr. Wm. Newcomet for radium treatment. Dr. Newcomet's report:

May 20. Radium 100 m. g., no filtration, in left nasal cavity for 2 hours.

May 24. Radium 76 m. g., outside, 3 m. m., filtration, ¼ in gauze, 4 hours, on position.

June 24. Radium 100 m. g., 3 m. m. lead ½ in gauze filtration, on upper left eyelid, 2 hrs., on lower left eyelid for 2 hrs., in left nasal cavity for 2 hrs. Total, 6 hrs.

October 18. Radium 100 m. g., 3 m. m. lead 1 c. m. wood, 3 positions on face, 2 hrs. each, 6 hrs., one position in left nostril 1½ hrs. Total, 7½ hrs.

October 24, she reported at the clinic at the Woman's Hospital. Her vision was good, and there was no swelling at the angle of the orbit, but she had what appeared like a suspiciously large middle turbinate.

October 26—X-ray report: Slight haziness on the inner wall of the left orbit, although a bony septum between it and the ethmoid cells can be recognized. The total width of the ethmoid is greater on the left than on the right. Other sinuses clear. (Carswell.)

At present the vision is good, there is no pain and no return of the growth at the inner side of the orbit. On internal examination there is hyperplasia in the ethmoidal region. She occasionally has a bloody discharge from the nose, but this symptom is always diminished following the radium treatments.

"ONE CASE ADENOCARCINOMA OF THE PARANASAL SINUSES."

This case was reported in THE LARYNGOSCOPE, June, 1917, by Dr. Warlow.

November, 1910: Mrs. K., age 59, presented herself in Dr. Warlow's office complaining of pain in the right side of the face, head, neck and in the right eye. The pain was very severe, being worse at night. On examination, there was tenderness on pressure over the right maxillary sinus. The right nasal fossa was obstructed by a large inferior turbinal, above which there was a firm mass filling the entire upper part of the nose. On contracting the tissues, the middle turbinal could be outlined and there was apparently a growth in the maxillary sinus pushing the nasoantral wall inward. Vision was apparently unimpaired. The teeth were in very poor condition. The patient was advised to have dental treatment, and was referred to the Woman's Hospital for investigation of the nasal condition, but she did not go.

May 1, 1911, she was again seen by Dr. Warlow. She was then very ill and practically insane with pain in the head.

History of the case since she had been seen in November: She had had seven teeth extracted without relief. The pain continued to grow worse and she was treated by her family physician for neuralgia for about three months. In February, 1911, she entered the Methodist Hospital, where she had an operation, evidently on the accessory sinuses. The surgeon in charge of the case informed the family that a second and more extensive operation was necessary, as she had cancer. As he could not promise a cure and said that the operation would be very disfiguring, they decided to take her home. She was again under the care of her family physician and her people were under the impression that she would live only a few months.

May 1, 1911, she was referred to my clinic at the Woman's Hospital.

Examination: Tenderness over the right maxillary sinus; exophthalmos of the right eye and vision almost gone; eye sensitive to light; left naris unobstructed. There was a large opening through the canine fossa into the maxillary sinus, the result of operative procedure. Pus was discharging freely through this opening into the mouth. The right inferior turbinal had been removed and all of the nasal chamber above was filled with a pinkish grumous mass of tissue.

May 30, 1911, the patient entered the Woman's Hospital. On transillumination, the right maxillary sinus was darker than the left. A probe passed through the opening in the canine fossa easily entered the sphenoidal sinus to a distance beyond 13 cm/ without meeting resistance. The direction was through the floor of the sella, and as we did not then have X-ray facilities at hand, we did not dare to probe further in that direction. We curetted a considerable mass of soft tissue from the ethmoidal region, but the bleeding was so great that we were compelled to desist from further interference. Microscopical examination of the tissue was: "A large amount of glandular tissue without malignant degeneration; connective tissue increase and thickening of vessel walls. Not malignant, may be simple hyperplasia of glandular tissue due to regeneration after an inflammatory process, or an absolute increase of glandular elements, *i. e.*, adenoma." It is possible we did not reach the malignant growth in securing the first specimen. All subsequent microscopic examinations showed malignant degeneration, reported adenocarcinoma.

Report of the case from the Methodist Hospital: Diagnosis: "Carcinoma of right antrum of Highmore."

Eye examination: "No vision in right eye; no reaction to light. Right eye shows a very marked projection of the vessels at the macular region and below in the periphery of the retina. Right optic nerve does not look very different from the left, although it is rather paler. I believe the eye is blind, either from temporary pressure on the optic nerve posterior to the eye, or to post-neuritic atrophy of the optic nerve of recent date."

Blood examination: Hemoglobin, 65 per cent; red blood cells, 3,140,000; white blood cells, 21,400.

The mental condition grew worse, the patient becoming maniacal suffering so intensely that it was necessary to keep her tied to the bed. Opiates and other hypnotics gave no relief.

June 20, 1911, under ether anesthesia, I ligated the common carotid artery and made a thorough exenteration of the ethmoidal and sphenoidal sinuses. The growth had destroyed the roof of the sphenoidal sinus and invaded the cerebral cavity. The soft tissue was cleared away in this region. I hardly thought she would get off the operating table alive. After operation, the patient was immediately relieved of pain and improvement began at once.

At present her general health is excellent. She has gained weight. Right eye is blind. Sinus opening in mouth is closed. Nasal cavity is clean. Her mental condition is poor, but she is able to do her own housework. This patient undoubtedly had carcinoma when first seen in November, 1910.

I regret that I was not able to bring her here tonight, but she has moved to the country, and on account of the rough weather, it was too difficult.

We find the suction curette a great aid in operations within the nose and sinuses.

1831 Chestnut Street.

THE TREATMENT OF OZENA BY OPERATION.

Dr. Louis E. Wolfson, Boston.

For the past several years there has been much discussion among rhinologists concerning the etiology and treatment of ozena. The work of Elmiger and Rohr, Forscher, Michel and Grunwald, Perez, Hofer and Kofler and others are well known.

Lautenschlager, who for the past 18 years has been operating on cases of ozena, holds to the theory that the disease of the nasal sinuses, in most cases the antrum alone, in many cases an infection of the ethmoid sinuses and in some cases diseased frontal and sphenoidal sinuses, are the initial cause of the disease. In his operation, he narrows the nasal cavity. This he does in the following manner: A radical operation of the antrum by Luc Caldwell's method is first done on both sides. The lateral nasal wall, by chiseling into the base of it through the opening into the antrum, is then pushed towards the nasal septum and held there by tampons and forming of synechial tissue between the lower turbinate and the septum, where they both meet. The sinuses, if necessary, are at this time curetted. The tampons are changed in 6 to 8 days the first time, and then daily until healing of the operating wounds. I have seen only two cases of Lautenschlagers operated upon, and only two post-operative cases, and can therefore not say very much about the results of his method. In Lautenschlager's method, we have a large post-operative opening between mouth and antrum, which must for a long time be tamponed with gauze and in many cases necessitates a plastic operation to close. Since Dr. Lautenschlager published his method, there have been many various other methods advocated of narrowing the nasal cavity by operation. Tibia bone and silver plates have been inserted under the mucous membrane and the lateral nasal walls have been brought to the septum by a method of screws, and many other methods of narrowing the nasal cavity have been described.

I have observed and noted 46 cases of ozena operations at Dr. Max Halles' clinic in Berlin and have personally performed five such operations and am therefore able to write something of the results of the ozena operation by Dr. Halles' method.

Technique of Operation. The operation is done under local anesthesia. The mucous membrane of the nose is first rubbed with 10 per cent cocaine and then the mucous membrane of the septum, nasal

floor and nasal lateral walls, and especially the lower and middle turbinates, are injected with ½ per cent novocaine. After 10 minutes the operation is begun.

An incision is made through the mucous membrane from just before the head of the middle turbinate to the head of the lower turbinate. The incision is continued from the head of the lower turbinate along the floor of the nose towards and perpendicular to the septum. The mucous membrane and periosteum of the floor of the nose is resected for about one-half an inch. A chisel is then put on the incision in the mucous membrane from the floor of the nose towards the head of the lower turbinate and is then chiseled through this incision into the antrum. This is done up to the head of the middle turbinate. A strong elevatorium is then put into the antrum through the nasal wall, and this part is pushed towards the septum. In the area where the nasal wall touches the septum, the both parts are scratched with a knife. The mucous membrane of the antrum is curetted out if there appears to be any pathological tissue there. The upper corner of the lateral antrum wall is tamponed so that it will remain against the septum. The tampons are changed every five days for four weeks, at the end of which time there will be synechia between nasal wall and septum. When the tampons are finally removed, the opening into the antrum very soon heals up.

I will give below a description of the cases before and after operation, that I have seen. In the cases of one, two and three years post-operative, I am unable to give a personal description of the case before operation and the histories were obtained when I had these cases come to Halles clinic to be examined. The operations were performed in most cases on patients with a very marked ozena.

Of the 34 cases that I observed personally before and after operation, I will give below 10 cases. I will also describe 7 cases of one year post-operative, 3 cases of 2 years post-operative and 2 cases of 3 years post-operative.

Case No.	History before operation	Local physical before operation	History and physical post-operation	End result
I E. Z.	Age 35—Bad odor, crusts in nose for 10 years. Irrig. nose 5-6x day—no results. Operation 2-19-1921.	Marked atrophy of mucuous membr. of nose, inferior turbinates very small, foul odor many crusts in nose.	3-10-1921—Here is yet a foul odor and many crusts in nose. Atrophy of M. M. not so marked. 6-6-1921—Odor and crusts much less than in March.	Still irrigates nose with normal salt H 2 O twice daily, condition improved.
II B. M.	Age 24—Foul odor and many crusts in nose for past year. Oper. 3-19-1921.	Marked atrophy of M. M., many crusts in nose and foul odor.	6-4-1921—No. odor from nose, few crusts, very slight atrophy of M. M. of nose.	Good.
III E. K.	Age 17—Foul odor and crusts in nose for past half year. Oper. 2-17-1921.	Atrophy of M. M., crusts and foul odor.	3-12-21—Odor and crusts markedly less. Some atrophy of M. M. yet present. 6-9-21—No odor, few crusts, no atrophy.	Much improved.
IV H. S.	Age 30—Since 1915 has had foul odor, many crusts and discharge from nose. Been treated by irrig. and massage with no result. Oper. 2-12-21.	Slight atrophy of M. M. of nose and many crusts. Foul odor.	3-11-21—No odor present. Few scabs, no atrophy. Has slight difficulty in breathing thru nose. 6-20-21—No odor and no atrophy present. Few crusts. Still has some difficulty in breathing thru nose.	Condition much improved. Will need to have another operation to improve his respiratory condition in nose.
V O. H.	Age 45—For past 25 years been bothered with many crusts in nose, loss of sense of smell for past 6 years, too much air goes thru nose, very foul odor from nose, frequent frontal headaches. Oper. 4-5-21.	Marked atrophy and many crusts in nose. Foul odor.	4-30-21—Atrophy of M. M. not so marked. Crusts diminished. 5-26-21—Atrophy slight, odor and crusts still present. Headaches not so frequent. 6-24-21—Slight atrophy, markedly lessened odor. Crusts still present. No longer complains of headache.	Improved.

Case No.	History before operation	Local physical before operation	History and physical post-operation	End result
VI A. R.	Age 56—Crusts, discharge and bad odor from nose since childhood. Tbc at 35. Has had caustic galvanic. Rx in nose and been tampooned daily. with no result, Has no sense of smell. Oper. 4-27-21.	Crusts, marked atrophy, pus, bad odor, Left inf. turbinate almost all gone. Rt. inf. turbin, much smaller than normal.	6-24--21—Patient feels better. Atrophy somewhat less. Still has odor, crusts, frontal headache and loss of sense of smell. Irrig. nose 2-3 x daily.	No improvement.
VII E. K.	Age 18—For past ½ year has had many crusts in nose, bad odor and frequent frontal headache. Oper. 2-14-21.	Atrophy, crusts and foul odor and polyps attached to middle turbinate.	5-7-21—Complains of not being able to breathe there nose well. Irrigates nose 3-4 x daily as before oper., does not have so frequent headaches, otherwise the same. Phys. exam. same as before op.	No improvement.
VIII M. P.	Age 25—Noticed bad odor in nose since 1917. Oper. 2-12-21.	Atrophy of M. M. of nose. Crusts and foul odor.	4-27-21—Atrophy decreased. Odor much less than before operation. A few crusts present. 6-20-21—Slight atrophy of M. M. no odor, a few crusts.	Improved.
IX R. K.	Age 43—Past 8 years foul odor and many crust in nose. Frequent frontal headache. Oper. 4-20-21.	Marked atrophy of M. M. Many crusts in nose. Foul odor.	6-24-21—Atrophy, crusts and odor much less than before operation. Headaches gone.	Much improved.
X M. H.	Age 19—Foul odor for past 8 months. Oper. 3-20-21.	Atrophy slight, many crusts and foul odor.	5-22-21—Odor gone. Atrophy and crusts same before operation.	Improved.

Case No.	History of before operation	History and physical post-operative	End result
I A. G.	Age 33—"Nose trouble" since age of 14. Treated for 19 years with no result. Had foul odor and severe frontal headache and many crusts in nose. Operation 9-3-20.	Slight atrophy of M. M. of nose. No foul odor, no frontal headaches, few crusts in nose. 3-10-21. 6-3-21.—Recalled for exam. Conditions very good. Few crusts in nose.	Much improved
II E. A.	Age 18—For 3 years had crusts, discharge and foul odor from nose. Operation 9-2-20.	3-12-21.—Slight atrophy of M. M. Few crusts in nose. Faintly perceptible odor. 6-2-21.—No evident atrophy of M. M. A few crusts, slight odor.	Improved.
III A. M.	Age 26—Bad odor, many crusts in nose since childhood. Operation 12-6-20.	3-19-21.—No evident atrophy of M. M., no odor, few crusts. 6-6-21.—Condition same as in March.	Much improved
IV T. K.	Age 21—For past 4 years had bad odor, many crusts in nose and frequent frontal headaches. Operation June 1920.	6-6-21.—Slight atrophy of M. M., faint odor, few crusts, no frontal headache.	Improved.
V A. C.	Age 51—Since childhood has had foul odor and many crusts in nose. Frequent frontal headaches, "unable to breathe thru nose." Paraffine injection 2 years ago without results. Operation April 1920.	4-28-21.—Slight atrophy of nasal M. M., few crusts, no foul odor, no headaches, can "breathe thru nose now."	Much improved.
VI K. K.	Age 21—In 1918 complained of frontal headache, slightly foul odor, continual "nose blocking" Septum op. in 1918—no improvement. June 1920 operation for Ozaena.	3-19-21.—Patient still complains of headache. Has foul odor and crusts in nose. Slight atrophy of nasal M. M. Rt. side—rt. lower turbinate not adherent to septum. 4-28-21.—Operation on rt. side.	Not improved. June 2 1921—Patient has all bad symptoms as before operation.
VII C. H.	Age 20—Odor and crusts in nose for past ½ year. December 1920, operation.	3-10-21.—Slight odor few crusts and slight atrophy of nasal M. M. Some difficulty in breathing thru nose. 6-6-21.—No evident atrophy of nasal, M. M., no odor, few crusts, still difficulty in breathing thru nose.	Improved.

Case No.	History of before operation	History and physical post-operative	End result
I Frau C.	Age 42—For about 30 years, has had crusts and foul discharge and foul odor from nose. Been treated without results, by many physicians in the past 15 years. Operation 12-17-1918.	4-25-21.—A few crusts in nose. No discharge and no foul odor. Mucous membrane appears normal. Irrigates nose once daily.	Much improved.
II V. J.	Age 26—For ten years before operation many crusts in nose and foul odor from nose. Also had very frequent headaches. Operation November 1918.	6-2-21.—Mucous membrane appears normal. No foul odor. Two or three crusts in nose. No longer complains of headaches.	Much improved.
III L. S.	Age 22—For 4 years before operation many crusts and foul odor. Operation November 1918.	6-3-21.—Mucous membrane slightly atrophied, several large crusts in nose. Does not irrigate nose.	Improved.

Case No.	History of before operation	History and physical post-operative	End result
I F. H.	Age 29—For 4 years before operation many crusts in nose, foul nasal discharge and very foul odor from nose. Operation February 1918.	6-21-21.—Mucous membrane on left side appears normal. On right side, slight atriophy of nasal mucuos membrane On right side many crusts. On left no crusts. Slight odor from nose. Irrigates nose 1 to 2 times daily.	Improved.
II F. K.	Age 41—Since 19 years of age—many crusts in nose and very foul odor from nose. Also had frequent frontal headaches and throat trouble. Operation November 1917.	6-21-21.—Nasal mucous membrane appears normal. Several small crusts in nose. Very faint odor from nose. Does not complain now of "throat trouble". Pharynx and larynx apparently normal.	Much improved.

TRANSFUSION OF BLOOD FROM IMMUNIZED DONORS.*

DR. LESTER J. UNGER, New York.

The enthusiasm which has recently been shown for blood transfusion is based on the fact that the technic of this procedure has been very rapidly simplified, that the dangers have been eliminated and that there is a greater appreciation of its therapeutic value.

The spectacular results following the transfusion of a patient who has had a severe hemorrhage are now well known to all. The great value of transfusion in diseases of the blood, toxemia, shock, debilitating conditions are rapidly becoming established. The value of blood transfusion in infections, however, is only beginning to be understood. There are two groups of otological conditions in which transfusion is of great value. In one group are patients whose blood culture is negative although their temperature is elevated and no demonstrable cause for fever can be detected. These patients have had a protracted illness. They have undergone one or more operations and perhaps even complicating conditions such as pneumonia. They are almost invariably anemic and appear exhausted. In practically all of these cases blood transfusion will cause the temperature to drop to normal almost by crisis.

The patients, however, upon whom I wish to lay special stress are those who show a positive blood culture. Up to the present time there has been considerable disagreement concerning the value of blood transfusion in cases of sepsis. This is probably due to the fact that the therapeutic value of blood of various donors is unequal and also that the methods employed in transferring the blood differed. Donors can be divided into two groups. In one group the phagocytic index is about 18 while in the other it is only about 6. By phagocytic index is meant the average number of bacteria ingested per polymorphonuclear leucocyte. It would seem that blood of a donor whose white cells are able to ingest about 18 bacteria is better able to overcome a bacteremia than that of one whose cells are able to take care of only one-third that number. Yet this fact has never before been taken into consideration.

The second factor which may explain some of the lack of results is the method employed for performing the transfusion. Methods

*Read before the Otological Section, N. Y. Academy of Medicine, March 2, 1922.

which supply whole unmodified blood are of far greater value than those which give citrated blood. If a specimen of a donor's blood is divided into two parts and one prepared as for a citrate transfusion while the other is left unmodified as for a whole blood transfusion, various differences can be detected. Sodium citrate markedly diminishes the complement in blood to be transfused. It extracts from the red blood cell walls a substance which renders the plasma anticomplementary. It also has a direct destructive action on complement itself diminishing the amount present. Complement is a vital factor in the defense against pathogenic organisms. It plays an important role in destroying bacteria. Anything which lessens the amount given is objectionable.

Another method of defense against bacteria is the phagocytic power of white blood cells. If the phagocytic index of a donor's whole unmodified blood is, let us say, 18, it will be reduced after citration to about 4 or 5. Sodium citrate also destroys the opsonins in blood and therefore interferes with the preparation of bacteria for ingestion. If citrated blood is given, the patient receives blood in which the complement is diminished in amount, the opsonins are reduced almost to nil and the phagocytic power is practically destroyed. It is evident that in cases of sepsis whole unmodified blood is of far greater advantage than citrated blood.

In the series of cases which is being reported, the method employed was the one which I described some years ago. This method supplies whole unmodified blood. It utilizes an instrument consisting of a stop-cock which allows of two simultaneous circuits. While blood is being aspirated from the donor, saline is very slowly being injected into the recipient's needle. The stop-cock is then turned and blood is injected into the recipient. Simultaneously saline is injected into the donor's needle. It is this continuous flushing with saline of that part of the instrument which is not being used either for aspiration or injection of blood that prevents clotting.

Up to the present time 106 transfusions have been performed on 64 cases of bacteremia. In analyzing these cases not only the source of the bacteremia must be taken into consideration but also the type donor from whom blood was taken. The cases can be divided into three groups. In the first group transfusions were performed using as a donor an ordinary strong healthy individual whose blood was compatible with that of the patient. Of twenty-five patients whose sepsis originated in the uterus and who received blood from an ordinary donor, two recovered. Of twelve cases whose sepsis originated in the mastoid, six recovered. Of two cases with bac-

terial endocarditis there were no recoveries and of three miscellaneous cases, one recovered. From this it is seen that transfusion of blood from an ordinary individual is of some, although not very great value as a curative measure except in cases where the source of the organism is the mastoid. Here the better results are undoubtedly due to aid given by surgery. In the second group of cases, attempts were made to enhance the value of transfusion and the bacteriocidal effect of blood. Donors were vaccinated with the organism obtained from the blood of the patient. This autogenous vaccine was injected in the usual doses starting with 100 million bacteria every other day and rapidly increasing the amount up to one billion. Seven cases were transfused with blood of such donors. None recovered. Tests performed with the serum of these donors and the organisms which were isolated from the patient's blood were negative for bacterial agglutinins. It was therefore evident that although these donors had been vaccinated they had not been immunized. The third group of cases were transfused with blood of donors who really had been immunized. The serum of such donors showed the presence of bacterial agglutinins in a titre as high as 1 to 60. The phagocytic index was greatly increased. Up to the present time I have transfused fifteen cases with such blood. Eight have received blood from a donor who had been immunized with the organism obtained from the blood of some other patient. Such a donor it is convenient to call a heterogenous immunized donor. Three of these cases recovered. Seven have been transfused with the blood of a donor who had been immunized with the organism obtained from the patient's blood—an autogenous immunized donor. The blood culture of six of these became negative —five went on to a complete recovery. These results, although it is admitted that the numbers are few, are nevertheless so striking and in such contrast to those obtained in the two other groups that one is justified in believing that for the present, at least, this is the best method of treatment for a case of sepsis.

The donor is immunized by injecting huge doses of an autogenous vaccine. Starting with an initial dose of one billion, daily injections are given and as much as 100 to 150 billion organisms are given in a week. These donors develop demonstrable immune bodies. If organisms are circulating in the blood stream of a patient the diagnosis can often be made as soon as 24 hours after taking the blood culture. That same day a transfusion should be performed either before or after surgical interference has been instituted. The donor who is used for the first transfusion should be a

heterogenous immunized donor. An autogenous vaccine can be prepared immediately and immunization begun. It takes about nine or ten days for a donor to develop immune bodies. If it is possible to wait that long it is advisable to do so. If it is possible to wait only five days, it is advisable to use this donor who by this time is partially immunized. If between the time of the first transfusion and the fifth day the patient is apparently worse, perform a second transfusion with another heterogenous immune donor. On the ninth or tenth day this is followed by a transfusion from the autogenous immune donor.

The question of selecting the donor to be immunized is of great importance. Up to the present time a satisfactory donor is one who has a normal blood count, no blood disease, and is not only of the same blood group as the patient but also is compatible when his blood is tested directly against that of the patient. These tests, however, do not take into consideration the fact that blood of one donor may be of greater value to a patient than that of another, even though they both belong to the same isoagglutinin group. Attention should be paid to tests which establish qualitative differences in the blood of donors. This is especially true in the treatment of bacteremia.

In selecting a donor to be immunized, therefore, one should in addition to obtaining a person whose blood is compatible with that of the patient, also select one whose phagocytic index is high. It has been found that certain donors will not to any degree develop bacterial agglutinins in response to the immunizing injections of the vaccine. Therefore, immunization should be begun on two or three donors or on one who has previously demonstrated his ability to produce these agglutinins. Before using him for the transfusion, agglutination tests against the organism found in the patient's blood should be performed to establish the fact that he has developed an immunity as a result of the inoculations.

By this method of treatment a bacteremia usually can be successfully combated. If the blood culture becomes negative, the temperature in some patients becomes normal. In others, however, in spite of the fact that the blood culture is negative, fever will persist. These patients should be examined thoroughly for the presence of an abscess or, as is often the case, abscesses. After these have been incised and evacuated, the temperature will become normal.

Conclusion:—Patients who have been operated for mastoiditis and who continue to have fever the cause of which cannot be ascertained,

and whose blood culture is negative, frequently are immediately cured by blood transfusion. The temperature drops to normal, almost by crisis.

Many patients with a positive blood culture can be cured by blood transfusion. Blood of an ordinary strong healthy individual is usually not sufficient. For these patients a donor should be used whose phagocytic index is high. The donor should be immunized by injecting huge doses of a vaccine prepared from the organism isolated from the patient's blood. While this autogenous immune donor is being prepared the patient should be supported by one or more transfusions of blood from a heterogenous immune donor. A method which supplies whole unmodified blood should be employed. Citrated blood for these patients is not as valuable because the complement has been diminished, the opsonins have been reduced almost to nil and the phagocytic power of the white blood cells has been interfered with.

36 West 75th Street.

A FEW IMPORTANT POINTS ON THE LA FORCE AND BECK-SHENK INSTRUMENTS.

Dr. Samuel Cohen, Philadelphia.

The La Force and Beck-Shenk tonsillectomes, occupy a most enviable position today in the field of tonsillar surgery. They are the instruments mainly in use, and have unquestionably proven themselves of great value in removing the tonsils completely, lessening the dangers from hemorrhage, lessening the amount of anesthetic, to be used; and most assuredly in the hands of the average operator, giving a more gratifying post-operative faucial appearance. Never injuring a posterior pillar, very seldom, and if one is very careful, never injuring or removing the uvula. (I once removed a uvula, and that, just after I had told the family physician, who was present at the operation, that it was impossible to do so with the La Force; but as this is only one case in about two thousand La Force operations, the rarity of such an accident is at once apparent. On in-

vestigation, I find that others had removed all or a part of the uvula and that this accident occurred in cases where the tonsils were so large as to be aptly termed the obstructive type, where the uvula is in direct contact with the tonsillar structure and the operator was not careful in placing his instrument between the uvula and the tonsil.)

Having watched many operators use these instruments, I feel that the technique altho learned very quickly is in many instances not as perfect as one would like it to be and that room for improvement is to be found a plenty. Permit me to add a few suggestions and so help the cause along.

As I am more in the habit of using the La Force than the Beck-Shenk my remarks will be more applicable to that instrument altho they may just as well be applied to the latter.

The underlying principle in these instruments, is the dislocation of the tonsil, thru the fenestra and so removing it either by knife or wire, still this principle should be adhered to with careful inspection and great caution. Pushing whatever one feels thru the fenestra then closing down on the handle and getting in as much as you can is not the hoped for thing. The pushing process, *should be done with exactness, method and above all not blindly*, as I have often seen it done.

It should be done under careful inspection. I have often seen the entire anterior pillar grasped in the mouth of the instrument and removed with the tonsil. The operator being none the wiser, only very much chagrined on inspecting his operative field several weeks later to find no vestige of the anterior pillar. Most operators depend on their sense of touch when using these instruments so increasing poor operative results.

The method I follow, and take pleasure in teaching, is as follows:

The operator, stands on the opposite side of the tonsil to be removed (thus avoiding the necessity of forcing him to bend over the head and body of the patient as would be necessary if he attempts to remove the tonsil from the same side that he is standing, and so placing himself, so to speak, in his own light, and preventing a clear view of the necessary operative procedure.) It is therefore necessary, and I believe better for the operator to change sides, when going from one tonsil to the other.

1. The instrument is first used as a tongue depresser, or the so called first position.

2. The free end of the instrument is pushed under the *lower tonsillar pole* and behind the tonsil; then the entire instrument is

rotated 90 degrees so that the handle is opposite the tonsil to be enucleated, and the instrument assumes a position across the mouth of the patient, its free end being behind the tonsils and between the tonsil and the uvula.

The handle of the instrument is then depressed thus pushing its free end upward, and causing the tonsil to form a prominence under the anterior pillar. The instrument is then pulled slightly toward the operator *so rotating or rolling the tonsil under the anterior pillar* and loosening it from its attachments. This action, that is, moving the instrument forward and backward is repeated a few times, (as I tell my pupils, one plays with the tonsils). This action also helps to get a complete view of the tonsillar mass. The next step, and this is a very important one, altho practiced by very few, is to pull the instrument backwards, (towards the operator) far enough to expose a distinct and clear view of the *free end of the anterior pillar.* With the thumb or index finger of the opposite hand (I prefer the thumb) the tonsil is pushed thru the fanestra, using the front bar of the instrument as a lever or corner around which the tonsil turns or everts itself into and thru the fanestra, breaking up any adhesions that may be present.

This instrument is still in the same position or as I term it, the second position, i. e. across the patient's mouth. Having felt the mass of tissue give way into the fanestra *over the front bar of the instrument,* the operator commences to close the instrument, pulling it a little toward himself, and with the thumb or index finger of the opposite hand keeps the dislocated mass in the fanestra and pulls or pushes the anterior pillar away from the advancing hemostatic bar of the instrument. As this blade closes down on the tonsil it should meet the free margin of the anterior pillar. Having assured that little if any of the anterior pillar will be included in the instrument's grip, its complete closure is permitted and the instrument is placed in the third position, that is up and down or parallel to the cheek.

This method of getting the tonsil through the fanestra should be adhered to carefully and conscientiously, thus helping to save all or almost all of the anterior pillar.

Being sure that the tonsil is dislocated through the fanestra, the hemostatic blade closed, and due care having been taken to protect as much of the anterior pillar as possible, the sharp blade is then brought down and the tonsil enucleation is complete. It is important to remember that following the removal of the tonsil the

instrument should be kept in its third position and *as little motion as possible permitted*. This precaution will aid in lessening hemorrhages, and possible tearing of the pillars.

The length of time necessary to keep the hemostatic blade on, following the removal of the tonsil, is a matter of contention. Most operators believe three minutes is enough, while others keep it on as long as five minutes. If the blood coagulability has been taken, I believe it is a good plan to keep the instrument on a little longer than the blood coagulation time. It is not the compression of the pillars that stops the bleeding, but the coagulation of the blood within the open carillaries or even larger vessels that causes the bleeding to cease.

The principles in the Beck-Shenk are almost the same as the La-Force. The time necessary to remove the tonsil after having once everted it through the fanestra(i. e., cutting it off with the wire) should be the same as in the La Force, a little longer than the patient's blood coagulation time.

The important point I wish to call particular attention and to lay stress on in this paper, is these instruments are not to be used by touch only. The sense of touch should be guided and controlled by the sense of sight and so more of the anterior pillar will be saved, less hemorrhages will ensue, and far better post-operative results will be seen.

1626 Spruce St.

PULMONARY ABSCESS—A STUDY OF NINETY CASES.

Dr. B. F. Glowacki, St. Louis.

The etiological factors of single pulmonary abscess of aerial origin in contra-distinction to the usually multiple abscesses of embolic origin, have often been regarded as more or less obscure. Recently, in addition, the prominence that operations on the upper respiratory tract, and particularly tonsillectomies, occupy in the category of etiological agencies, has been asserted by some writers to be very impressing; others again disclaim with equal vehemence, that the occurrence of pulmonary complications has been grossly exaggerated. The early diagnosis of lung abscess too has not been ventured with any degree of confidence in the presence of the marked pathological alterations.

A study of the cases occurring at the St. Louis City Hospital and several other institutions, in the past five years, reveals some very interesting features.

That the incidence of pulmonary abscess is not very great is evidenced by the twenty-eight cases of unquestionable abscesses within the past five years. There were 94,000 admittances to the City Hospital in this time. The condition is definitely predominant in the male, but four cases occurring in women.

The pathological changes are well known in those instances where abscess complicates a pneumonia; recently, however, Paul Aschner describes the "bronchiectatic abscess," a distinct type of pulmonary suppuration, occurring with impressing constancy in post-tonsillectomy infections. It is described as a localized dilatation of a small bronchus with a purulent content, with other bronchi of irregular calibre escaping from it. The surrounding parenchyma shows a purulent or interstitial pneumonitis, depending on the age of the process.

In general abscess terminates in three ways: (1) It most frequently ruptures into the bronchus and thereby drains. (2) It may assume an exasperating chronicity. (3) Rarely, the abscess ruptures through the pleura.

The prognosis under palliative treatment is favorable in about 50 per cent of the cases. In fourteen selected cases, with single lobe involvement, Howard Lilienthal reports a mortality of nearly 50 per cent after lobectomy. Surgical interference was not practiced in any of our cases. Of the twenty-eight cases reviewed,

fourteen improved, eleven died, and the condition was unchanged in three instances. Advanced age and previous debility were in nearly all cases responsible for the morbidity.

The abscess is either acute or it is chronic. The first impression upon physical examination is that of an obscure infection, but absolute certainty of diagnosis can be made in the course of a few days by the character of the expectoration. After an initial, abundant and purulent sputum, which is usually fetid, though sometimes sweetish, there is a diminuation in the quantity. The coughing diminishes, fever and leucocytosis drop. After an interval varying from a few days to a month, an exacerbation of all the symptoms ensues, the patient becomes bed-ridden again, and another evacuation of pus takes place. Haemoptysis often occurs. *Chronic abscess* may possess this same intermittent nature, but the constitutional symptoms are much less severe, and the patient is often as in at least four of our cases, referred to the hospital, for pulmonary tuberculosis.

The physical signs are not at all constant, simulating the findings over a consolidated lung, or the findings of an empty or partially filled cavity surrounded by inflamed lung tissue, depending on the effectiveness of the drainage through a bronchus. Pleuritis fibronous, or serous, as in two cases of the series, complicates the syndrome.

The X-ray findings are particularly valuable when the pus and necrosed tissue are encapsulated, or in chronic abscess when the clinical signs and symptoms are not so distinctive. It was noted that in several instances the Roentgenologist suggests the probability of a pulmonary abscess when the clinical diagnosis of bronchiectasis, tuberculosis or a-typical pneumonia was maintained. Nothing is more graphic than to view a Roentgenogram displaying a considerable increase in density of a portion of a lobe with an area of decreased density in the shadow; after evacuation of considerable expectoration this area becomes distinctly rarified. In two instances a fluid level could be definitely noted.

The following case may be cited as a typical one. A fairly well developed boy of eight years enters the hospital two weeks after a tonsillectomy with a cough and complaining of a pain in right scapula. Temperature 104°, pulse 124, respiration 34. The initial physical findings consisted of crepitant rales just below inferior angle of right scapula; no change of the breath sounds or vocal fremitus. There was no cardiac enlargement, the rate was rapid, 120 to 138 and a systolic murmur was audible at the apex. For

four days the temperature ranged from 100° to 102°. Widal and blood culture were negative. Dullness and bronchial breathing were now noted in the same area. W.B.C. 16,700. The cough became more aggravated, the expectoration more purulent and the breath fetid. During the second week the fever was still high and fluctuant, coughing persistent; the pulse became more rapid and irregular. At the end of the third week the temperature became normal. The X-ray disclosed the evacuated abscess with surrounding fibrosis. A week later the patient left the hospital, all his symptoms having entirely abated.

ETIOLOGICAL FACTORS.

	Number	Mortality
Pneumonia	8	6
Tuberculosis	3	1
Influenza	2	0
Tonsillectomy	2	0
Foreign body	1	0
Questionable	12	4

There is no record of abscess following post-operative pneumonia. Lobar pneumonia, complicated by abscess, proved very fatal; incidentally, four of the six patients that died were between the ages of nineteen and twenty-seven years.

Three cases were associated with apical tuberculosis, the abscess cavity occurring in one of the lower lobes of the lung. The latter feature could be attributable to a latent or a-typical pneumonia. Because of the existence of definite tuberculosis, and the inability of recognizing a true pneumonia, the three cases are classified as processes associated with tuberculosis. In the cases of questionable etiology, neither occupation, age nor previous illness could be consistently associated.

Contrary to a very prevalent opinion that abscesses are common following operations on the upper respiratory tract, there are but two instances of abscess following tonsillectomy. The total number of tonsillectomies performed aggregated 1100; general ether anesthesia being employed in nearly all the cases. The two lone instances of post-tonsillectomy abscess surely do not support the reports of its supposed prevalency. In a personal correspondence with Dr. A. J. Hrudy of Chicago Municipal Tuberculosis Sanitarium, he enumerates twenty-four cases of pulmonary abscess in the past five years, and only three following tonsillectomy. This Institution has a population of 1000. The etiological factors in the production of lung abscess may be tabulated briefly, as follows:

Pneumonia, 4; tuberculosis, 3; influenza, 4; tonsillectomy, 3; foreign body, 2—1 tonsil snare, 2 tooth after laparotomy; post-operative laparotomy, 1; sore throat, 1; questionable, 6.

St. Mary's Hospital and Infirmary (St. Louis) admitted 2500 patients in the last fiscal year; 332 tonsillectomies were performed. There were but two cases of lung abscess reported after tonsillectomy, one terminating fatally.

At Barnes Hospital, Dr. Graham very kindly assisted in this study, and for the past five years 28 cases of pulmonary abscess were enumerated, two being post-tonsillectomy infections.

Mode of production: Several explanations have been proposed: (1) aspiration of blood and infected detritus; (2) liberation of infected emboli into the circulation; (3) extension through the lymphatics. Being impressed with the constancy of the onset of the initial symptoms—about two weeks after tonsillectomy—and the lobe most often affected (lower), it appears as if infection results from direct aspiration.

SUMMARY.

1. The incidence of pulmonary abscess was only .07 per cent of all cases admitted at the above mentioned institutions.

2. The X-ray has proved a valuable aid, particularly in recognizing the insidious abscess.

3. Ninety cases of abscess were collected, 9 of this number occurring post-tonsillectomy. For every 358 tonsillectomies one abscess occurred.

4. Blood-stream and lymphatic extension may produce an abscess, but direct aspiration appears to be the most frequent mode of transmission of infected material.

5. The prognosis has been favorable in 50 per cent of cases under palliative treatment; with surgical intervention in selected cases (Aschner, Am. Annals of Surg.) about 50 per cent terminated in improvement.

St. Louis City Hospital.

A NEW NASAL SUCTION-IRRIGATION APPARATUS.*

DR. JOHN M. LORÉ, New York City.

In the consideration of the home treatment of certain nasal conditions, especially acute sinusitis, chronic sinusitis, ozena, chronic or acute catarrhal conditions, post-nasal catarrh and other similar ailments, two things especially must be sought:

First: Whatever infectious material, secretions or pus may be present in the accessory nasal sinuses must be drawn out into the nostrils.

Second: These secretions or pus must be removed. To help the patient do these things various apparata have been devised, none of which, however, do these things well and without danger.

The methods at present employed are: 1. *Dry Suction:* This method, the motive force of which may be either a motor or water, simply exerts suction action inside the nose *without* completely removing or washing away the obnoxious material. This method, as far as it goes, is a good one, but it does not go far enough.

2. *Ordinary irrigation by positive force:* This simply washes out by irrigation whatever secretions may be present in the nostrils without cleaning out the sinuses. This method is attended with some danger, viz: the forcing of some of the solution used into the middle ears wiih subsequent infection of these organs.

3. *Suction irrigation by positive force:* This apparatus has as its motive force an overhead pressure produced by a bag, filled with some solution, held at a level higher than the nose. With this method the inflow depends primarily on the overhead pressure. This method also has an objection, the inherent danger of forcing some solution into the middle ears.

The ideal method is one in which: (a) Sufficient suction action is exerted on the nasal sinuses, (b) the secretions withdrawn by (a) would be washed away, (c) there would be no danger of forcing foreign solutions into the middle ears, (d) the manipulation is simple and consumes the least time and effort.

---

*Read before the Section on Rhinology and Laryngology, N. Y. Academy of Medicine, Nov. 23, 1921.

The apparatus described below seems to meet these requirements, not only theoretically but clinically, it having been used in many cases with good results and no ill effects.

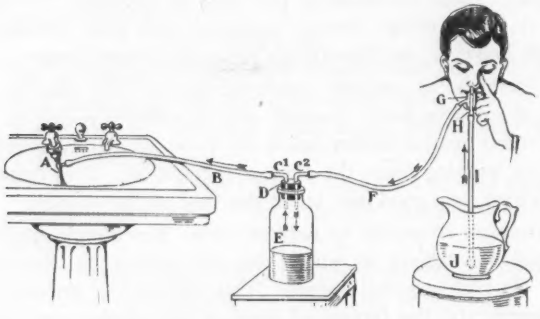
The underlying principle of it is *negative force* produced easily and simply.

The apparatus consist of the following parts:

(a) A converter which can be attached to any faucet so that when the water is turned on a powerful suction action is produced (this is a patented article). For office use a motor may be substituted for it.

(b) Rubber tubing of certain caliber and strength, attached at one end to the converter (a) and at the other to (c).

(c) Which is a L shaped glass tube. This glass tube passes through an opening in a rubber stopper marked (d) in the diagram.



(e) Is a glass jar or wash bottle, of a quart size.

(c-2) Is another L shaped glass tube, one of which goes through the other opening in the rubber stopper (d). To the other end of the tube is attached rubber tubing (f).

(f) The end of this tubing (f) is attached to (g).

(h) To this (h) is attached a piece of rubber tubing similar to (b) and (f). To the free end of the tubing is a metal weight (j).

(j) This weighted end is to be submerged in whatever solution it is desired to use.

The working of the apparatus is as illustrated:

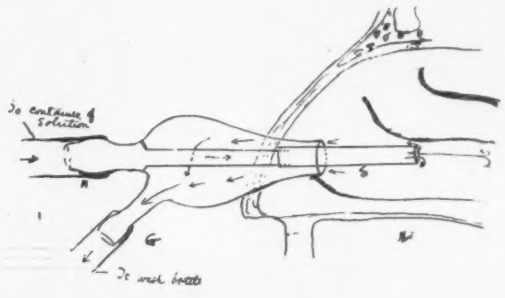
The nose piece is first moistened and then introduced into one nostril, care being taken that it fits snugly.

The length of the soft rubber tubing (s) is made as long or short as is desired.

While the glass part is in one nostril, the other nostril is closed and the patient directed to say "K" repeatedly, thus making the nostril into which the glass piece has been introduced, practically a closed chamber.

The suction generated by (a) creates a vacuum in (e), which generates a suction action in the nose, providing one nostril is closed and the soft palate raised by having the patient say "K-K" repeatedly.

The suction created in each nostril is sufficient to draw the solution up the rubber tubing (l) and into the nostril as far back as the end of (s). This solution is then drawn forward and removed by means of outlet (g), the attached rubber tubing and collected in the wash bottle.



Summary: (1) This apparatus works by *negative force.* (2) It sucks and irrigates at the same time, washing away the sinus contents as they are sucked out. (3) It induces and produces a healthy hyperemia in the nasal chambers. (4) It is simple to work and can be used by children. (5) Danger to the ears is eliminated. (6) Suction force is automatically controlled by the rubber tubing collapsing at the proper time.

PRACTICAL SUGGESTIONS.

(1) A preliminary spray of the nose with a weak cocaine-adrenalin solution is desirable in the average case.

(2) To insure an air-tight fit in the nostril, it is best to smear a little vaseline on the sides of the nose piece.

(3) It is best to have the rubber piece which is introduced into the nostril point directly back.

(4) Speaking the letter K loudly, rather than whispering it, will insure a closure of the naso pharynx by the soft palate.

(5) The solution should always be at a level lower than the nose.

(6) To get the rest results the inlet tube should be pinched at intervals to create dry suction.

(7) After sufficient solution has been used, air should be allowed to circulate in the nostril by drawing the weighted end out of the solution.

(8) This apparatus is especially efficacious in those cases in which an antrum puncture has been performed.

244 West 71st Street.